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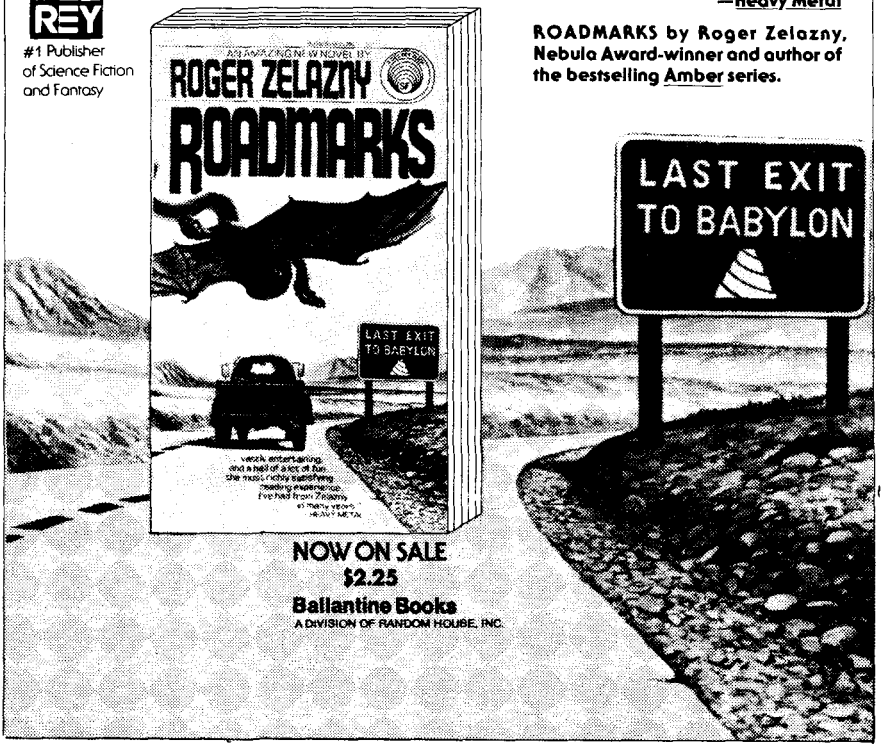

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CONTENTS

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Vol. C No. 9
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SCIENCE FICTION
analog®
SCIENCE FACT

novelette

The Tactics of Despair,
Edward A. Byers. . . .**8**
What the Vintners Buy,
Mack Reynolds. . . .**76**
Corley,
Gary Alan Ruse. . . .**120**

science fact

Demythologizing the Black Hole,
Richard Matzner, Tsvi Piran, Tony Rothman. . . .**33**

short stories

The New Physics,
Charles Sheffield. . . .**56**
The Struldbrugg Solution,
Susan M. Schwartz. . . .**64**
The Olmec Football Player,
Katherine MacLean. . . .**106**
Faraway Eyes,
Rudy Rucker. . . .**110**
The Touch of Their Eyes,
Steven Gould. . . .**150**

reader's departments

The Editor's Page. . . .**5**
The Analog Calendar
of Upcoming Events. . . .**61**
Biolog. . . .**149**
In Times to Come. . . .**164**
The Reference Library
Tom Easton. . . .**165**
Brass Tacks. . . .**172**

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EDITORIAL

HOUSEWARMING

BY

STANLEY SCHMIDT

Beginning with this issue, Analog has a new home.

As you may have already heard, Analog was bought by Davis Publications, Inc.; and this is the first issue produced under their auspices. I look forward to a long, happy, and productive association with the Davis "family."

Just as when I assumed the editorship, I think it is appropriate that I take this occasion to assure you that Analog will remain Analog, and to let you know what we can look forward to in our new environment.

First, let me emphasize that our parting with Condé Nast, like our stay there, was a friendly one. Joel Davis, president and publisher of Davis Publications, Inc., had been interested in acquiring Analog for quite some time, believing that the Davis family of magazines would provide a better setting in which to develop Analog's full potential. And not without reason. At Condé Nast, Analog was always something of an "odd child" among such magazines as *Vogue*, *Glamour*, *Mademoiselle*, *Bride's*, and *House and Garden*. The Davis group includes, among others, *Isaac Asimov's Science Fiction Magazine*, *Ellery Queen's Mystery Magazine*, *Alfred Hitchcock's Mystery Magazine*, and *Science and Mechanics*.

I think it's fairly obvious which of those groups has more in common with us, the Analog people. That's why I find it quite reasonable to hope that Davis will have both more experience and more interest in providing the special kinds of support that a magazine like Analog needs. Condé Nast finally decided to sell in the belief that that would be the case and the transfer would ultimately be good for the magazine as well as for both publishers.

Naturally, Joel Davis and the other people we'll be working with in our new home hope to strengthen Analog, but the improvements they have in mind are *not* in the area of editorial content. I will continue to edit Analog as I have been doing, with the same attitude and approaches I have previously spelled out in regard to stories, articles, and editorials. Marc Kaplan, as Associate Editor, will continue to oversee the physical production of the magazine. Analog will keep, and continue to grow with, its unique character and distinctive look.

In particular, we want to emphasize that Analog and *IA'sfm* will remain

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quite separate and independent—even competing, though obviously we'd be delighted to have you buy and read both. Sure, George Scithers and Isaac Asimov and I will sometimes get together and talk about what we're doing; we've been doing that all along. Now that we're under one roof, I may occasionally save an author some postage by showing George a story I can't use but think he might—or vice versa. But when it comes down to decisions, each of us will continue to make and be solely responsible for his own, according to his own tastes and needs.

The special expertise and energy Davis can bring to Analog lie in the business area: such things as getting Analog before the largest possible audience. *Not* by making Analog over into a different magazine to appeal to a different audience, but by expanding the audience we already have. My mail makes it very clear that there is already an audience quite devoted to just the kind of magazine we're already producing—but there's a lot more that can be done, and Davis plans to do, to enlarge that audience. I know—for example, from the number of students I met when I was teaching college who had been voraciously reading Analog stories in anthologies but didn't realize they came from a magazine—that there are many other readers who *would* like what we're doing if they knew we were doing it. Our job is to get the news to those people: to get Analog into their hands and let them see that it is something they enjoy reading and want to continue reading. The folks at Davis have an impressive track record of doing just that for other magazines; and they have several concrete ideas, for which I have high hopes, of how to do it for Analog. If they succeed, and our list of satisfied subscribers grows, it can only benefit all of us: the more solid our financial foundations, the better we can do the things we'd like to do with science fiction and fact. I will be working with these people to make the new approaches as successful as possible. We have other ideas, too—for example, I think you'll be seeing a lot more Analog anthology activity, including at least one Fiftieth Anniversary special—but you'll be hearing more about those as they develop.

Transitions, of course, are never completely without problems. At the time I'm writing this, it appears probable that your subscription copy of this issue will arrive without the accustomed wrapper and with the mailing label affixed directly to the cover. We're no happier about this than you are. But it's the best we can do right now, with the printing facilities we're using and without another price increase—and we're very actively seeking a feasible way around it. Meanwhile, we'll be using a more durable cover and placing that label where it hides as little of the art as possible.

The last time we went through a series of personnel and production changes, we experienced a brief period when more error crept through than we would normally tolerate. We'll make every effort to see that this doesn't happen again; but if it does, please bear with us. (But by all means keep letting us know how we're doing. Keep us on our toes!) This, too, shall pass; and when it has passed, Analog should emerge

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stronger than ever.

Nobody can foresee the future exactly, of course. But the added support Davis is prepared to give, coupled with the continued growth of the editorial philosophy already established—and your continued feedback—should lead to a period of new vigor for Analog. We plan to keep our quality but reach more people with it. That, in turn, should lead to more feedback, and more story input, that will enable us to boost the quality still higher.

My hope, in short, is that our move is just what we need to initiate a positive feedback loop whose results will be good for all of us—Davis Publications; the writers and artists without whom the magazine could not exist; and, most importantly, you, the readers. ■

READER'S CHOICE

YOUR CHANCE TO EDIT AN ANTHOLOGY!

One of the best pieces of news to come out of Analog's recent purchase by Davis Publications, Inc., is that we'll be producing anthologies, in both hard and soft covers, from time to time—initially, we're aiming for one a year. We're already at work on the first one, a special book marking the Fiftieth Anniversary of Astounding/Analog, which we hope to have on sale by the end of the anniversary year.

Special as we hope to make this one, there's obviously too much memorable material in those fifty years to squeeze into one volume. So what I'd like to do for our second anthology, next year, is to put together a collection of *your* favorites, *as picked by you*. So I need your suggestions to guide me. (The last time an announcement like this appeared here, the result was *The Astounding Science Fiction Anthology*, edited by John W. Campbell, Jr., and still recognized as a classic.)

Please read on. Because of the volume of response I expect, and the small staff we have to process it, it is *absolutely essential*, if you want your votes to be counted, that you submit them in a form we can handle easily. Here's what I ask: from all the stories, articles, and features ever published in Astounding or Analog (sorry, no serials), pick *not more than ten* that you would like to see included in a new and important anthology. Then write the title and author of *each* on a *separate* 3x5 index card and mail all your cards in one envelope to Analog, 380 Lexington Ave., New York, NY 10017. (It'll help if you write ANTHOLOGY on the envelope.)

I regret that we can't consider votes submitted in any other form. We'd like to accommodate you, but we have a simple system for dealing with these cards and we simply don't have the manpower to try to fit other forms of votes into it.

This book should be a dilly, and I look forward to your input. I'm not sure, at this writing, when the cutoff date will have to be for counting your votes, but it's none too early to start thinking about them.

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Far to the west, Verde's sun diffused the clouds in orange and crimson. Twenty degrees above the equator, it was windy and warm. Late afternoon. With a sense of foreboding. I watched the vegetables tumble out of the stargate and sprawl all arms and elbows in the deep-piled grass.

"That's all of them," Colonel Shagata said. He stood ramrod straight, his gray hair close-cropped, eyes glinting coldly. Not a pleasant man. Not a man you would want to meet in an alley.

I had been counting the vegetables. There were thirty: the famous Panther Platoon. In the meadow below the stargate they shuffled like sleepwalkers, their progress marked by an unpracticed infantile bonelessness. Power weapons, sufficient to reduce a city, hung uselessly from their shoulders.

They were, Shagata assured me, the cream, the elite, of the Royal Naval Marines.

Well, maybe . . .

Twin dots of color appeared on Shagata's checks as he watched. He opened his mouth, then closed it again with a snap. Finally he strode forward, sunlight catching the metal of his epaulets, the mirror-like shine of his boots. A modern conquistador, I thought bleakly; a Japanese Pizarro.

He came to the nearest soldier, took him forcibly by the collar, turned him around. He slapped the flaccid face, his own registering an acid contempt.

"That won't help," I told him. "It takes as least half an hour for the drug to wear off."

THE TACTICS OF DESPAIR

"To see ourselves as others see us..." and it can be no less important to see the world as others see it.

EDWARD BYERS

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H.R. Van Dongen

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He looked at me with distaste. "It was your idea, wasn't it, the drug?"

I returned his hostile look, then shrugged. "Of course. There isn't any other way through the Gate."

He let the soldier go and watched him slouch off, muscles slack, coordination gone, brain all but disconnected. A disgrace to the uniform he was wearing, if only temporarily.

Shagata surveyed his army of imbeciles and stood even straighter. His face went white—he'd had a thought. He said, "For God's sake, Kirst. Did I behave like . . . *that*?" His expression clearly conveyed what he was thinking. He was thinking that his own iron faculties had faltered. He was thinking of himself floundering helplessly, eyes glazed. He was imagining me watching—that last, perhaps, most of all. I would have seen him in weakness.

I looked at him and grinned. "If you had not been . . . *like that,* Colonel, then you wouldn't be here. Simple as that. It's the fare you pay when you use the stargate."

"Then the fare is too high!"

"I didn't invite you here," I said with heavy sarcasm. Then I shrugged. He had been on Verde an hour, I had been there a year. There was no fare too great; he was wrong, but now was not the time for debate.

He gave his men another glance, a punitive one, then looked at me. "I'll want to talk to you when our camp is set up," he said abruptly. He strode to the return plaque, then, and examined it. "You use this often?" he asked.

The steel-alloy artifact came to Shagata's chest. It was a foot thick at the base, slightly less than that at the taper. It shone in the sunlight, coldly, with the translucence of old pewter. Touch the surface in the proper pattern and the stargate operated in reverse—it whisked you back where you came from.

"I've used it on occasion," I said, answering his question. I walked over to him and pointed out the pattern. Simplicity itself. Place your hand here . . . and there . . . and there. Wave goodbye . . . you had half a second to complete the gesture.

"You don't need drugs for the return, do you?" Shagata demanded.

I shook my head. "I brought some with me on my first trip, but I didn't need it. The sensors work only one way, apparently."

He nodded, then folded his arms and looked around at the towering trees, at the savannahs that stretched to the horizon, at the vaultlike sky and countless lakes. As near to Eden as he would ever come, I thought. I wondered if he saw it that way too.

He looked at the glowing sky a moment longer and then dismissed it. He put his hands down flat on the top of the plaque and raised his eyebrows.

"Where are the Verdeans?"

"They have a village three or four miles from here," I said. "That's where the Sachem lives."

"Ah yes," Shagata said significantly, "the Sachem."

A meticulous soldier, Shagata wanted his camp close enough to the stargate to defend it if necessary. The nearest high ground was a tree-covered hill a mile away. He marched his men there and there followed an hour of feverish

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activity. Before night had fallen the area sprouted a small sea of tents.

Three of Shagata's Panthers, moving with the easy motion of conditioned athletes, laid a rope around the top of the hill.

"That is a *kele* ring," Shagata said. He gave me a look of amusement. "Have you heard of it?"

"No."

"It is a tradition in my command. It is an arena for challenged and challenger. To leave the ring you may step across the rope as victor—or be carried across it as vanquished. No man of honor leaves the ring while he may yet stand and fight."

He abruptly clapped his hands. Two Panthers, armed with wooden staffs, stepped across the rope into the ring. Faces expressionless, they bowed to Shagata, then to each other.

Shagata clapped his hands once more.

They sprang at each other, the staffs moving almost too fast to follow.

It lasted for less than a minute. One of them executed a spin and thrust that caught the other lunging the wrong way. There was a loud sound of wood striking bone. The victor looked down for a moment at the man he'd beaten, then bowed again to Shagata and stepped back across the rope.

"You'll stay for dinner, of course," Shagata said, turning away.

He introduced me to his subordinates, a long-jawed captain named Yamada and a lady second-lieutenant named Noriko. Like all the Panthers, they dressed in one-piece uniforms the color of a wet seal. Like all the Panthers, they were lean and brown and competent-looking. As I shook their hands I caught the impelling odor and sizzling hiss of grilling steaks. It had been a year since I'd had steak. I had intended to refuse Shagata's invitation, but now I found myself grinning. Salivating. Blackmail, I decided, could be an art.

We ate at a small table set up in Shagata's tent. One of the tent walls was raised to give us a view of Verde's lush twilight.

For a period of perhaps a minute, just before darkness settled in, there was a golden haze as light suffused the clouds. The wind picked up and flowed around us silkily. Shadows around the big trees turned pale-jade and turquoise before melding into background. I held my breath. It was magic—yet it happened every day on Verde.

Shagata wasn't watching. He spoke into a comm unit on his collar and a moment later there was a furious hissing crackle. The trees could still be seen, but only in outline. The night sounds had vanished.

I looked across the table at him. "Is a repulsor bubble necessary, Colonel? What can attack you . . . here?"

Repulsor fields were a development of the Earth war. It was a passive system, useful against energy weapons. Its greatest disadvantage was that it could not be moved without setting up ripples in its energy field. When the ripples got big enough it turned itself into a bomb. Repulsor fields were also prodigious consumers of oxygen, turning the molecules into unstable allotropes of ozone and souring the air with resultant ozonides. Twenty-four hours under a repulsor bubble and you literally stank.

Shagata merely shrugged and continued eating.

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"It's habit, Kirst. I always err on the side of safety. I don't know this world as well as you do."

No. Not now, not in a century.

There was a moment's silence and then the long-jawed captain put down his fork. He gave me an earnest look. "Excuse me, Dr. Kirst. I've read a little about the stargate, of course . . . but I don't understand why we had to be drugged before we could use it."

I nodded and explained as briefly as possible. The Gate was an alien artifact, the builders as yet unknown. The coin of their cosmic turnstile seemed to be of one metal only: a civilized mind, sophisticated enough to be void of predatory instincts. Mankind (with perhaps a few exceptions) failed that criteria. Hence the drug. It served to dampen instinctual drives. It permitted Homo sapiens to use the Gate without tripping the sensors the aliens had built into it.

Captain Yamada thought about it. After a moment he worked his long jaw and laughed. "What you've done, then, is invent a cosmic lead slug."

I nodded agreement. That was close enough to a one-sentence explanation.

Shagata permitted himself a small smile and changed the subject.

"I understand you were against this expeditionary force, Kirst. 'Unwanted, unneeded, and unnecessary' was your phrasing, I believe. Have you changed your mind?"

I shifted in my chair. "If you've read that much of my report, you've read the rest. I haven't changed my views."

Shagata finished eating. He lit a small cigarette, inhaled deeply, blew smoke into the air. At length he said slowly, "The rest of your report described the sort of force *you* had in mind."

Yamada and Lieutenant Noriko looked at us in mystification and I finished my meal. It was good steak. I had no way of knowing when I would have another.

Shagata looked down at his cigarette and then up at me. Delicate skeins of smoke drifted in the air.

"Lieutenant Noriko," Shagata said at last. He turned his head a little to take her in. "You're familiar with Kirst's reputation, aren't you?"

She gave me a nervous half-glance. "Yes, sir. Dr. Kirst was one of the leading tacticians in the fight against Earth. Some theoreticians believe that without him we'd have lost the war."

"That's too strong," Shagata murmured, "but go on."

"Well, we studied two of his texts in college—*Strategical Techniques* and *Modes of Attack*."

"Did you find them enlightening?"

"Yes, sir."

"Well, then," Shagata said, "you might be interested in his recommendation for an expeditionary force on Verde."

Noriko swung her head toward me, then back to her commanding officer. "Yes, sir. I would."

Shagata leaned back in his chair. "His recommendation, Lieutenant, was that all expeditionary forces using the stargate be composed of philosophers or poets. No military presence at all. What do you think of that?" He raised his eyebrows and stared thoughtfully at his junior subordinate. Immediately to her left, Yamada extracted a cigar from a hidden reserve and used the time to examine it carefully. His long face hid any expression.

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The girl frowned. "I don't understand."

"Neither did the Navy," Shagata remarked dryly. He poured himself a cup of tea from a carafe and sat sipping it. His eyes, the blackest I'd ever seen, stared at me over the cup's rim.

I shrugged. "My views haven't changed. I can still see no reason for a military outpost here. What are you guarding?"

Shagata put down his cup. "The stargate, of course—and our representatives here."

"*I'm* the only representative here," I said. "And you can guard the stargate at the other side."

Shagata looked at his cigarette, which had developed an inch of gray ash. Then he gave me an ironic smile and refilled his teacup.

"The stargate was never intended as a military launch point," I said tiredly. "A military force here could have disastrous consequences. I told them that in my report." I stopped. I was wasting my breath; Shagata had no intention of turning around and going home.

"We're not here to start anything," Shagata said abruptly. "We're here only to observe."

"How many times have military men said that?"

He shrugged, and we all fell silent. Several moments later he broke the tension by grinding his palms together and putting out his cigarette. He looked across the table at me.

"Tell us about the natives."

I told them. The Verdeans were small creatures, the largest no more than four feet tall. They had long skulls and small even teeth. They were olive-colored, their skins covered by a downy fur. There were about a half million of them on Verde.

"They're friendly?"

"Yes."

"And the Sachem?"

Same description, but scaled up by a factor of two. About eight feet tall, with a broader, more flattened skull. The teeth were small sabers. The fur was the color of unripe apples, and made a thick close-napped pelt.

"This big one, he is intelligent, is he not?"

I stared at Shagata. I wasn't used to being cross-examined, and found I didn't like it very much. I shut my mouth and waited to see if he would repeat his question.

"Is he as intelligent as we are?" Shagata's finger rotated around in a small circle.

"It's likely," I said. "Maybe more. There's no measuring stick for intelligence above a certain level. Nor is there one for certain *kinds* of intelligence."

"I see," Shagata said. "Point taken. Why are there half a million of the small Verdeans and only one Sachem? Don't you find that intriguing?"

"It's one of the peculiarities of the species, Colonel. One of many. There has always been a Sachem—though exactly what formula is followed in producing him is still a mystery. As to function, apparently he's there to look after the others, give them guidance. There aren't any large predators, so he's seldom called upon to defend them."

"Some insects select one of their number to serve as queen," Yamada pointed out. "Maybe that's the case with the Sachem here on Verde."

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"Maybe," I said. But I didn't believe it. Too many things didn't fit.

Shagata got to his feet and paced, his face set in flat planes, his movements short and jerky. He paused after a moment and turned toward me.

"Kirst, I want Lieutenant Noriko to accompany you when you go back to the Verdean village. She will act as liaison between you and this command. She can keep your records, do whatever duties you assign her. You'll find her a very intelligent woman. She is exceedingly thorough."

"I don't doubt it," I said dryly. I held tight to my teacup and looked at him. Then I gave way to a deep-seated anger. "Do you have any idea of your arrogance, Colonel? Are those orders, or merely suggestions?"

The line of his mouth tightened. He took two steps and stared sightlessly through the repulsor bubble. An inflexible man, I thought. Iron brittle, iron tough. He'd break before he would bend.

"Take it as a suggestion," he said without turning.

"Then, thanks, no. With apologies to the lady, I don't need a spy in my camp."

"And if it had been an order?" He turned his head and raised an eyebrow.

"I'd have ignored it. I hope you understand, Colonel, I'm not part of your command. I won't obey your orders."

Shagata sat again. He withdrew a fresh cigarette and looked at it critically.

"Your perogative. Of course your refusal to cooperate means I'll have to set up a liaison team of my own. Likely a squad of marines and a sergeant. That could be unfortunate. They would probably lack your . . . finesse. It's your choice, Kirst."

He gave me a bland smile.

Blackmail can be a bludgeon, too.

I considered my options. Correction. It was singular. Option. I stared intently at Shagata. He wasn't an enemy—not yet, anyway. But he *was* an adversary, and it would not do to underestimate him. After a moment or two I shrugged my shoulders and gave him a nod.

"Lieutenant Noriko it is," I said.

"Fine." He touched fire to the new cigarette and pocketed his lighter. "She can be ready in an hour. Is that suitable with you?"

"Quite suitable," I said. I looked at the girl. "I hope you like native cooking, Lieutenant."

The village was scarcely large enough to warrant the name. It consisted of a dozen leaf-thatched huts and a grassy common. Surrounding it were high bluffs and towering thick-limbed trees. Since the only light came from Verde's low-albedo moon, everything was steeped in shadow. To someone not familiar with the terrain the village would have been invisible.

I grasped Noriko's shoulder and stopped her in front of one of the darker mounds. "This is my hut," I told her. I switched on a portable light and showed her where to stow her gear.

The hut was large enough, about ten feet by twelve, but nearly all the interior space was taken up by equipment I had brought through the stargate. Noriko looked around at the stacks of books and tapedex, the camp table overflowing with rock specimens, at the survey-computer in its shrine of druo-plastic.

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Hugging one wall were the sole concessions to domesticity, a rumpled army cot and a battered footlocker. She completed her inspection and gave me a lopsided grin.

"If it's the same to you, Dr. Kirst, I'll sleep outside. I'm used to that."

There was a single chair by the camp table. I swung it around and slumped down on it, then gave her my full attention. She wasn't cute—she was streetwise tough, and a different sort of animal than her commander. Spring steel rather than cold iron. She wouldn't break, she'd bend like a buggy whip. She had a thin oval face that bore a continual sardonic expression. Shrewd, I thought, rather than merely intelligent.

"Brandy, Lieutenant?" I opened the footlocker and dug out a half-empty bottle and two glasses.

"No, thank you, Doctor." She looked faintly apologetic. "I don't drink."

"Since we're going to be together for some time, call me Pan," I said. I put one of the glasses back and filled the second. Then I took a drink and looked up at her.

"What has Shagata told you about me? That I'm anti-military? Anti-Navy?"

She stared at me uneasily. "I would rather not discuss what Colonel Shagata did or did not say. He gave us a briefing but it was confidential."

"Since you won't say, it couldn't have been complimentary," I said. I gave her a bleak smile. "He would have been right, though. I *am* anti-military."

She shifted her feet, stared at her hands. Then she put them in her pockets.

"I would think . . ." she began, and then stopped.

"You would think what?"

"Well, that you would be *pro*-military, if anything. After all, you were a tactician. You and one or two others virtually directed the war against Earth."

I kept my eyes focused on her face. Inside, I could feel the old anger building. I finished the brandy and worked at keeping the emotion from showing in my eyes. I had been a tactician, all right. I had directed the fleets against Earth—and all along the way lay the waste of that effort. Earth herself I'd blanketed with plague, and those who survived did it in spite of me, not because of me.

Pan Kirst—death-bringer!

Once the war was over, when I was sure we had won, I was foolish enough to think I could forget all of it, bury myself in research, lose myself in work.

It wasn't that easy, of course. It never is. The war followed me, put its brand on me. There were some, a handful, who held me accountable for my actions, the millions of dead—the dreams that would never be fulfilled.

Unfortunately for my peace of mind, I had become one of *those*.

"Tell me about Shagata," I said, more sharply than was meant. "Is he really made of stone, or is that just an impression I get?"

She laughed. "You've heard of the Panthers?"

"Yes. Stories."

She nodded. "They're true, most of them. Colonel Shagata took the sweepings, the empty husks, the human garbage thrown out by the other services of New Nippon—and molded them into one of the most renowned fighting units in the outworlds."

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"And Shagata, he leads them by example?"

"That's right. He is a master of the martial arts. Have you heard of samurai, Dr. Kirst?"

"Yes."

"Colonel Shagata considers himself a modern version of that ancient warrior. He believes in *bushido,* the samurai code of honor."

"Why does he dislike me so much? You would have had to be blind not to notice."

She gave another nod. "You sent men to their deaths, but did not fight yourself. You lack honor in his eyes."

"And the Panthers," I said, "what of them?"

She smiled. "They are extensions of his arms. They would do literally anything for him."

"I see. And what about you, Lieutenant? Would you do anything for Colonel Shagata?"

She gave me a challenging look. "I'm a Navy officer, Dr. Kirst. That first. And then . . . I'm a Panther."

And that, I thought gloomily, said everything.

In the cool brightness of morning, things seemed a little better. Outside the hut, rain fell lightly. Droplets glistened on the leaves of the trees. Birds chirruped. The morning fog had gone.

I turned and directed my attention toward Morge, who stood watching me with a dour kind of patience.

Verdeans were not human, though there were certain superficial resemblances. They were bipedal and had opposed thumbs (though only three fingers). Their bony heads rotated birdlike on long thin necks. Running horizontally above their noses was a dark bar of chitinous material—their organ of vision.

Morge's fingers moved in practiced motion, talking to me in pidgin sign-talk.

"Your friend does not stay with you?"

"She preferred to sleep outside," I said. "I hope she did not get wet." Though they could not speak English, Verdeans had excellent ears, and a few of them had mastered a smattering of the language. Morge's vocabulary topped three hundred words.

"She did not get wet," he signed. "She slept beneath a Tobuk tree."

I nodded and went toward the door. "Let's go see the Sachem," I said.

We found him in front of the largest hut, squatting by the communal food dish. With him, leaning against the hut's support pole, was Noriko.

"Good morning, sir . . . uh, Pan." She looked up long enough to give me a smile, then switched her glance back to the Sachem. "He hasn't moved in almost an hour," she said. There was no mistaking the awe in her voice.

I shrugged and settled into a cross-legged posture just to the left of the Sachem's splayed feet.

"I've known him to stay in one position for days on end," I said. I studied the living mountain before me and felt an impelling awe of my own.

His Verdean name was Cirlos, which meant "He Who Teaches." Seated before him, in his broad shadow, I felt like a pygmy come to visit a sequoia. The Sachem was huge. More, he was tranquil, monumental, a living creature

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who somehow bore the stamp of godhood.

We waited. Cirlos breathed in and out, shallow but even. From time to time, like a metronome, air ruffled through his nostrils.

"Cirlos gone," Morge signed. To the right of Noriko, he had assumed his patient waiting stance.

"Yes," I said.

Noriko caught the exchange but could not read the gestures. She squatted by the pole and took up a handful of dust, let it trickle through her fingers.

"He know we're here?"

"He knows."

Behind us several other Verdeans appeared as if from the ground. They began an animated conversation, the sound range far too high for human ears.

Another hour crept by. There was no movement on Cirlos' part save the breathing. After fifteen more minutes the girl began to squirm.

"You sure he knows we're here?"

Morge signaled a reply and I translated it for her.

"Sir, Cirlos knows. He sees. He hears. He pays you brief notice. Like flowers. Like grass. Like me . . . like Bof here." He broke off and touched another Verdean.

"Christ!" Noriko said explosively. She gave me a quick glance out of her tough-guy face, took up another fistful of dust, let go of it, and rubbed her hands together. "Tell me again how they see," she said. "Not being able to look them in the eyes has me bugged."

It had bugged me too, the first time I'd encountered it. So much of human expression is transmitted with our eyes that their absence is disconcerting.

The Verdeans were unaware of light wavelengths. The chitinous bars that served them for eyes focused another energy entirely—life-quanta. Their sense of sight was an acute awareness of the life-forms surrounding them.

Verde's biosphere seethed with living organisms, a thick soup of life. The Verdeans were aware of microorganisms as a background against which the larger animals (including humans) moved as brightly burning forms.

It was an interesting evolutionary adaptation. The Verdeans couldn't see through ordinary window glass, but they could move in pitch darkness as casually as they did in daylight.

There was sudden movement. Cirlos straightened his shoulders and turned his head a little, angling it down at me. Banana-sized fingers moved with sure dexterity.

"What is he saying?" Noriko asked. She left the support pole and seated herself beside me.

"He's simply greeting us," I said. " 'Hello—good morning,' that sort of thing."

"He's Buddha-like," she whispered. She stared up at the broad green form.

"He is," I said in agreement. I wondered briefly if her comm net was open. Was Shagata listening? I shrugged and turned to the Sachem. We began our usual discussion. As we talked I translated his hand movements so that the girl could follow along. As always, our conversations had many lines of approach—and as many avenues of retreat. We trod lightly, with caution and a sense of mutual respect. There was no sense of hurry.

For both of us it was unexplored

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and extremely sensitive territory.

I wasn't sure what Cirlos wanted from me, but I knew full well what I wanted from him. Simply put, he had a secret, and I intended to ferret it out.

I already had an inkling.

Verdeans communed with ghosts.

There had been a time when man defended his cave and his woman by using fire—and all manner of tools—against his enemies. What developed was his ability to think in a logical fashion. He became sophisticated. He developed ever more useful tools. Space ships and hunting spears, after all, share a common ancestry.

The Verdeans chose a different path, but one that had proven equally effective. They formed an alliance with a sort of energy creature, much as man and dogs formed an early alliance. The difference was that dogs are not invisible quasi-intelligent flying energy clouds.

They were not invisible to the Verdeans, of course. Since they had life-quanta they showed up in the Verdeans' peculiar field of vision. To them the Symbiotes must have seemed like giant birds, darting here and there through the biosphere.

I called them Symbiotes for lack of something else to call them. Few in number, they varied considerably in size. Some were as large as battleships, great undulating masses of swirling energy. Others were tiny by comparison, a foot or two in diameter.

It was not for the first time (or even the second or third) that I wondered what kind of teeth they had and what their bite would feel like.

In the days that followed, Noriko learned signtalk. She built herself a hut across the common and spent her spare time helping me analyze rock samples.

I hadn't tried to hide my interest in the Symbiotes and my in-residence second-lieutenant took the ball and ran. I hadn't been told she was an electronic whiz. She rigged up an energy screen that ran off the computer's power supply and scanned the biosphere for Symbiotes. She didn't find any, but she didn't give up, either.

How hooked, I didn't find out until later.

About a week later I was shaken awake rather rudely by Morge. While I sat up groggily and tried to get my brain functioning, he talked with his hands. Shouted, if that was possible.

"Sir, lady needs help!"

"What's wrong?" I reached for my pants and shoes while keeping Morge's fingers in view.

"Hurry, please! She fight with Sachem!"

Oh, brother!

Fighting was not the precise term for what was going on. I had visited a zoo once, and watched a gorilla (all 500 pounds of him) hold his errant child over his head and shake it for some real or imagined wrong. *That* was what was going on.

I stopped running and looked up. Lieutenant Noriko was approximately twelve feet off the ground, held in the rigid vise of Cirlos' tree-limb arms. He looked angry, disturbed. They both did. Noriko's face was a curious color fast approaching puce.

"What happened?"

"Never mind—just get me down!"

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She glared at me, then transferred her anger to Cirlos. She tried to kick him. Without apparent effort the big Verdean lifted her higher, shook her harder. I could hear her teeth rattle.

I got her down eventually, spitting mad. Cirlos ignored us both, settled himself in a meditative posture, and was gone. For all intents and purposes we no longer existed.

"So what happened?" I asked.

She glowered at the Sachem and shook her head. "I don't know. I was just talking to him, asking him about the Syms—the Symbiotes."

"That's what I thought," I said. I looked at her. She hadn't been hurt; only her dignity had suffered. "The Symbiotes are a taboo subject."

"What do you mean taboo? *You* talk about them."

I shrugged. "Cirlos and I have established ground rules. When a question gets too close to the quick, we back off, try another approach."

She smoothed her hair in impatient thought. "What makes the Syms taboo?"

"Beats me." I gave her a crooked grin. "What makes a subject taboo for us?"

"I didn't know we had any. Name one."

I named one.

Late one afternoon Noriko put down the fossilized coprolite I'd given her, stopped punching numbers into the survey-computer, and gave me a long meditative stare.

"Pan, we've always questioned the meaning of life . . ." She stopped, then continued hesitantly, "I wonder what Cirlos thinks about it."

I had pondered the same thing long before. "You can be sure it has a meaning for Cirlos—for all the Verdeans—that it doesn't have for us," I told her. Take away the rich broth around us and they would be blind. They could never, I thought with dim regret, journey into space. Nor would they ever see the stars. They were caged, forever constrained, by the boundaries of this single world.

Trapped.

In Eden.

Of course, no road runs just one way. What might the Verdeans see that we could not?

Occasionally Noriko went hunting, her only weapons a set of five ornamented knives. Small game was plentiful, her skill bordering on the magical. We ate well.

"Have you ever used *luade* knives?" Her eyes, almond-shaped, looked the question at me.

"No."

"They have exquisite balance." She handed me a fistful of bright sharp steel and pointed out a block of wood fifty feet away. "You need not throw them hard; a simple snap of the wrist will suffice."

I tried, missed, tried again, hit. I hefted the next one and admired the working of the steel.

"All Panthers carry *luado* knives," Noriko said solemnly. "They are a tradition."

"Colonel Shagata seems fond of tradition," I said.

"That may be." She recovered the two thrown knives, handed them to me.

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"These are yours, Pan. My gift to you. That also is a tradition." She looked at me and laughed.

They brought the dying Verdean in at twilight, carrying him carefully so that his arms would not drag. When they reached the Sachem they put him down gently on the ground, smoothed his fur, and seemed to converse among themselves. Verdeans appeared from nowhere, and these, adults and children together, pressed in around the common.

Under the trees it was dark, quiet. Too dark to see clearly. There was a fire burning, and it threw shadows that flickered eerily over the massed throng.

Noriko touched my shoulder and whispered, "What's happening?"

"Watch," I said. I had seen a similar occurrence once before, the second month of my stay on Verde. Then, as now, Cirlos had rendered last rites.

He put both palms flat on the ground beside the small twitching form. Then he lifted them and began to pound the ground, each blow striking with more force than the one preceding it. The dying Verdean jerked and stiffened, and the sound of the pounding throbbed in the air.

Abruptly Cirlos stopped. His head lifted and he stared tensely at the emptiness before him. Then he rose and his arms strained upward in their effort. Firelight flickered over him, turning him briefly into a statue of hollows and points, a demon now, not a demi-god.

Then, as quickly as it had begun, it was over. There was a faint rustling as the Verdeans turned and vanished among the trees. The body was quickly removed. Night settled full, blackening the shadows, turning the sky into a bowl barely discernible, the moon just beginning to rise.

"What was *that* all about?" Noriko asked. She turned toward me and I could just make out the oval of her face.

"Where does light go when you turn off a switch?" I asked. "Where does life-quanta go when a Verdean dies?"

"Please tell me of storms," Cirlos said. He was seated in his favorite place at the end of the common. His fingers moved expressively and his massive head turned to stare down at me. He seemed restless, almost agitated.

I studied him for a moment before answering. For weeks and months I had been trying to read expression into the apple-green of his face. I thought now I detected something. What, though? Sadness? Resignation?

I gave it up. I described a thunderstorm for him, but that wasn't what he was after. His fingers moved in a new pattern.

"Are there other storms?"

I nodded (he would see my life-quanta sway toward him) and told him about hurricanes and cyclones, then expanded my lecture to take in typhoons and tornadoes. Tornadoes seemed to interest him briefly, then he dismissed them as well.

Toward the end of our discussion he did something he had done before, though rarely. He reached out one hand and placed it over my head, so that the green spatulate fingers formed a cup. If he had closed them he could have crushed my skull like an eggshell.

"Energy builds . . . energy dis-

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charges . . . in these storms," he said with his free hand, his head held still and cocked a little to one side. I thought of an inquisitive grizzly bear.

"Yes."

"How is that done?"

I explained as best I could how electrical charges build and dissipate, always following the shortest path betwen cloud and ground. I told him about lightning rods.

He was quiet for a long time, his hand gripping my head like a melon. Then he took it away and drew in a breath.

"I think . . . you must be . . . a lightning rod," he signed. He lifted his head then and stared at something invisible in the air. He looked at me again. "Such energy as you describe builds around you, friend Pan. Builds and breaks . . . and builds again." He moved his fingers in a slow methodic fashion that expressed sadness.

Goddam! What did *Verdeans see?*

That evening Noriko came into my hut in a somber mood. She flung herself down on the army cot and looked dispiritedly at the ceiling.

"I've just talked to Colonel Shagata," she said without preamble.

I looked up at her and shrugged, then bent again to study the laminations of a fossil. Royal Navy business, not mine. I was aware, of course, that she reported daily to Shagata on the comm net, but I wasn't interested enough to find out the contents of her reports. Simply enough put, I wanted no part of the Royal Navy, no part of Shagata and his command. Not so long as he let me and my work alone.

She swung her legs over the edge of the bunk and sat up. "He wants us to come back to command headquarters," she said.

"You go," I said shortly. "You're his subordinate, I'm not."

She looked around as if trying to find something she'd misplaced. She frowned and shook her head.

"He wants me to bring the Sachem."

I put the fossil aside and stared at her. "Are you serious? Or, rather, is *he* serious?"

Noriko nodded.

"He won't go, you know."

She nodded again, looked at her hands. "I know, but I'll have to ask him anyway. Those are my orders." She gave me a plaintive look. "Will you come if he does?"

I thought about it. Verdeans were not curious creatures, or, if they were, they satisfied it by means other than man's. In the year I'd been on Verde, the Sachem had never left his village. I felt safe enough.

"All right," I said, picking up the fossil again. "If Cirlos decides to go, I'll tag along."

Which proves something. There is no such thing as a sure thing.

Cirlos agreed to go.

Shagata's camp had been transformed. He'd cut down the thick-bolled trees and turned them into buildings. The hillsides were stripped of concealing brush and while straight from the manual it was effective enough; he'd provided himself with some excellent fields of fire.

He seemed suitably impressed at our approach, though Noriko must have told him what to expect. What he could

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not have been prepared for were the hundreds of small Verdeans who pressed around on all sides.

He did not let it bother him. He advanced on our straggling line, saluted, looked with a frozen face at Cirlos' immensity, then led the way to a small pavilion set up on the bare slope.

"I have gifts for you and your people," Shagata told Cirlos. He indicated a stack of boxes on a table.

I watched him closely. If he wasn't lying, he at least wasn't telling the entire truth. Traditionally, gifts would have been taken to the Sachem's village, not the other way around. No, Shagata was a man who dealt from strength; he understood the uses of power. Well, I thought gloomily, so did I. It was clear to me he wanted us here for reasons other than gift-giving.

Captain Yamada was standing by the table, his long face immobile. He examined the Sachem with wide eyes. Then he saw me watching and gave a friendly nod.

"I understand Verdeans are fond of Tobuk-root tea," Shagata said abruptly. "We've prepared some. Captain Yamada, see that it's given out, will you?"

While Yamada was supervising the dispersal of the tea, Shagata turned,

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smiled, and indicated half a dozen chairs set under a canopy. "Please be seated," he said. Cirlos ignored the chairs and sat instead on the ground beyond the pavilion's roof. Forced by circumstance, Shagata bowed to the inevitable and sat down across from him, crossing his legs, keeping his spine ramrod-straight. Grinning inwardly, I joined them. Lieutenant Noriko was the last to be seated, settling herself familiarly between me and Cirlos' large feet.

Gifts were brought and duly presented. Surprisingly, they were good choices. Since Verdeans did not see, in any human sense, it would have been useless to give them brightly colored cloth or mirrors or any of the common trade goods. He'd chosen instead music boxes and incense and vials of spice.

I sipped my tea and kept my eyes on Shagata. He was not a particularly subtle man. When the other shoe fell, I thought, it should be evident enough.

Then he spoke softly into his comm net and the Panther Platoon marched smartly out onto the slope. Sunlight sparkled off polished metal, carved dark shadows beneath the bowls of their helmets. They executed several maneuvers with a drill team's precision. Any parade sergeant would have been proud of them. At last they drew to a halt, saluted, then went to parade rest. It was very nice, but I was sure Shagata had something else in mind.

He spoke into the comm net again. Then he glanced speculatively at the big Verdean. His final unblinking stare was directed toward me.

"We're building a new headquarters, Kirst. A permanent Navy HQ. I thought the Verdeans might appreciate seeing how we do that." He removed a cigarette from his jacket pocket, put it between his teeth, and grinned at me.

I stared back at him. "Oh? And how *will* you do that, Colonel?"

He lit the cigarette and squared his shoulders. Even smiling he managed to look menacing. "We're doing the excavating right now," he said. "A nuke of just the right size is already in place. Take a look." He made an abrupt gesture with one hand and the marine troop swung around. They faced a small hillock halfway to the stargate.

I followed his gaze. So, I thought—the other shoe. And a damned big shoe it was! If Shagata was out to impress the locals, he'd likely succeed. As a demonstration of raw power, a fusion bomb's a real grabber—even a vest-pocket nuke like he'd be using.

Then I thought about it a moment longer and felt the blood drain away from my face. I graped Shagata's arm.

"For God's sake—call it off! You don't know what you're doing!"

He shrugged my hand away. "On the contrary, Kirst. I know exactly what I'm doing. I'm showing the Verdeans how the Navy digs a hole." He smiled coldly and turned around, his face rigid in profile.

I wanted to say something—anything—but it was already too late. The hillock vanished in a sudden gout of upward churning plasma. A column of incandescent gas burned its way into the heavens. We felt the shock waves, a little of the heat, and then an aftermath of shocking silence. No fallout, minimal radiation. They make very small, very clean bombs these days.

The effect on the Verdeans was little

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short of paralysis. They watched with a mounting horror that left their limbs stiffened. Then they turned as one and ran, blundering straight into Shagata's line of marines. Two of the Panthers went down, one of them struggling with his weapon.

Seen through human eyes the explosion was spectacular enough. Through Verdean eyes it must have seemed as though the world was coming to an end. A hole, black and yawning, would have opened suddenly in front of them. A crack in the sky. The column of fire (firestorm!) would have stripped away part of the biosphere, leaving an emptiness, a void—*the first the Verdeans had ever seen!*

The fallen Panther recovered his rifle and struggled to stand up. A Verdean landed on his chest and bounced off and, angered, the soldier swung his weapon in a short arc that caught the alien across the neck. He went down, his small form quickly buried beneath the stampeding feet of his fellows.

In the same instant Cirlos lurched erect, every muscle outlined beneath the green pelt. His mouth opened in anguish, in silent rebuke. He took four strides and flattened a handful of Shagata's marines. Then he reached down, searching for that small quiet form.

Silence. That was the worst part. The sound of their terror was a mute aphonic resonance, a stillness that shrouded the slope and haunted the awareness.

Shagata was on his feet and moving toward the Sachem. He began to rap orders into the comm net, his face flinty hard but showing the effects of shock.

"Yamada! Noriko! Get the men moving back toward camp!"

"Yes, sir!" Noriko called out. She skirted the melee and ran toward a knot of separated Panthers. To her left, Captain Yamada grabbed a man and shoved him upslope toward the Navy camp.

A marine Cirlos had struck down rose up on one knee. He swung his rifle in a half-circle that left its muzzle pointing at the Verdean's broad middle. Cirlos had bounced him hard, his helmet had been ripped off, and along with it his comm net receptor. He could not hear Shagata's bawling commands. His weapon tilted slightly and a bright flash of fire burned a hole through the Sachem's promethean shoulder, nearly amputating his left arm.

The Sachem stood for a moment, looking blankly around at the rapidly vanishing Verdeans. His face gave an expression of sadness, of pain not physical. Abruptly he turned, walked, fell.

"Shagata!" My throat burned from screaming. I caught up with him and banged him on the shoulder. I pointed. "Get his legs! We have to get him to a medic!"

Two Panthers helped me lift the burned head and shoulders. Noriko joined Shagata, lifting one leg like it was half a tree trunk.

"Careful," I cautioned. I began a sliding run upslope, hoping my grip on the bloodied shoulder would not slip before we got him to a medical unit. Even for five the Sachem's weight was extreme, and protecting his injured arm made the task more difficult.

Something was happening to the Panthers still behind us, but I couldn't afford the luxury of looking around. Shagata did, and his face went a slack slate-colored gray. Then he mumbled

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something into his comm net and the sky suddenly darkened. I realized we were inside the camp. Shagata had pulled down the repulsor curtain.

The Sachem was alive, though barely. His pulse was feathery, a trace that wandered across the med unit's screen like a minnow going upstream. Nothing to do now but wait. I turned around and fixed my gaze on Shagata.

"What did you see out there?"

Shagata had grown old in the minutes the incident had taken to develop. His eyes had the glazed look of a steer in an abbatoir.

"The Panther command is dead," he said dully.

"What do you mean—dead?"

He made a gesture and seated himself tiredly in a chair. "Only the five of us and three or four others made it back to camp. The rest are . . . out there." He jerked his thumb toward the slopes.

"Yamada?"

He shook his head.

I turned toward Noriko. She gave me a dim mockery of her old grin.

"Did you see it?" I asked her.

She gave a short nod and said carefully, "Have you ever watched somebody touch the bus bars on a power station? I did. This was worse. Much worse." She stared down at the floor between her feet. For the first time since I'd known her she looked vulnerable.

Shagata was recovering. He looked at me sharply, his eyes haunted.

"What happened, Kirst? Do you know?"

"I can guess," I said. "When Cirlos was attacked he sicced the Symbiotes on us."

They considered it, then Noriko said, "Maybe the nuke stirred them up."

I shook my head. "Nothing happened until after Cirlos was hit. Think back."

Shagata started to speak, then his gaze flickered past me, came to rest on a small goblin-like figure tugging without effect on Cirlos' good arm.

"How did *he* get in here?" Anger made his voice tremble. He flung himself out of his chair and took a long stride forward.

At his appraoch the small Verdean cowered, though he did not leave the Sachem.

"Colonel!" I took a step and put myself between them.

"He says he wants to help," Noriko said from her chair. Her eyes followed the small green fingers. "He wants to stay here. With Cirlos."

"How did he get in?" Shagata demanded again. His brows lowered heavily over his eyes.

"He came through the bubble," Noriko said shortly. "His name is Morge. I know him, Colonel. He understands English."

"Then ask him what happened to my men, to my command."

Fingers flashed. "Symbiotes," Noriko translated instantly.

Anger flickered like lightning across Shagata's face.

"Cirlos! The bastard deserves what he got!"

I held up a hand. I had read the Verdean's signals too, and I had seen . . . *something* . . . that Noriko had not.

"Morge."

The Verdean swiveled his head. He stood by the Sachem's shoulder in an

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attitude of defeat. By the way his cheeks puffed in and out I suspected he was wailing, though I could not be sure.

"Morge, how does the Sachem control the Symbiotes?"

The fingers moved. "Pan, I cannot break the faith of my Sachem and tell this thing." There was pleading on the small face.

"I know," I said. "And I'm sorry I have to ask. But it is the only chance we have. And it's the only chance the Sachem has, as well."

He thought about it for a space of seconds. Then his fingers moved again and, behind me, I heard Noriko suddenly gasp.

Shagata looked from one of us to the other and his eyes snapped fury.

"Well, what is it?"

"I've been wrong about the Symbiotes," I said sourly. "Dead wrong. I thought they were domesticated, partners with the Verdeans. I wasn't even close."

"You mean they're not?"

I shook my head. "They're sharks, or the closest thing to it. They follow the Verdeans constantly, stalking them."

Shagata looked puzzled.

"They're afraid of the Sachem," I told him, and there was a bitter taste of accusation in my mouth. Shagata sensed it and said nothing.

"Put a dolphin in a tank with a shark and he'll kill it within minutes," I said. "The Symbiotes—imagine calling them that—dared not attack as long as Cirlos was around."

Noriko stood up and glanced over the readouts. Cirlos was holding his own, but just barely.

Shagata grappled with it. "And when he fell . . . out there?"

"Feeding frenzy," Noriko interjected somberly. She sat back down in her chair.

The three of us stared across the eight or so feet separating us and each thought our own thoughts. I suspected that Shagata was just beginning to realize the consequences of his actions. Not only was his command decimated, but outside the repulsor bubble the Syms were hunting, and it was my guess they found the hunting good.

Twelve hours later I stood outside examining the repulsor field, seeing through it the dim gray light of dawn. I hadn't slept well, and the reek of ozone had given me a headache.

Cirlos had survived, though the ordeal left him weakened and in a coma. His physiology was strange to the med unit, and it had overcompensated wildly when it amputated his arm.

He had broken out of the coma four hours later, then drifted back into a deep but normal sleep. He would live—no thanks to his human hosts. I sipped from a flask of brandy I had brought with me from the village and thought about Verde. Here, too, I had brought death. First Earth, with her tall cities and blue oceans—and now Eden. What was it the Sachem had said? I was like a lightning rod, drawing down energies of destruction. I laughed grimly and finished the brandy. My scythe was vast, it seemed. It reached to the stars.

I heard gravel crunch behind me and turned that way. Noriko gave me a sober look and then stared over my shoulder at the bubble.

She said, "You were right after all,

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weren't you? This was a place for poets, not soldiers." She placed her hand on mine in a gesture of understanding.

When I didn't say anything she turned around and looked directly at me. "You blame Colonel Shagata, but you shouldn't judge him too harshly. Despite what you think, he is a man of honor, a samurai. Fighting is all he knows."

I gave a hoarse laugh. "True enough," I said, and then smiled in spite of myself. Who was more to blame, the lightning or the lightning rod? I turned away and studied the pale dawn light again.

"I don't think it matters very much," I said. "Not any more. I was with Cirlos when he came out of coma this morning. We talked for a time. He thinks only a new Sachem can stop the Symbiotes now. They've broken any hold *he* might have had on them."

"How long will it take to find a new Sachem?"

"Weeks. Months. Years." I shrugged. "Too *damned* long."

She stood still and studied my face and whatever light was in her eyes died a little. After a moment she smiled, that old sardonic tough-guy smile of hers.

"And in the meantime—what will happen to us?"

"In the meantime," I said brusquely, "we can sit and wait—until we run out of oxygen—or we can go out and fight the Syms."

Exiting a repulsor field is not unlike pushing through soft asphalt. It is possible only because the field's purpose is to keep out high level energies, not a body measuring its forward velocity in feet per minute. Don't lean against it—you'll fall through.

Thirty-six hours later Cirlos was not only standing—miracle enough—but standing and walking. The left side of his body was swathed in synthetic skin and antibiotic jelly.

Beside his tall form Morge seemed little more than a child. Together, the Sachem's hand firm on the small Verdean's shoulder, they passed through the field.

"Cross your fingers," Noriko said from my right. She gave me a wan smile. Should the small Verdean live, it meant Cirlos retained his power. It meant life for those inside the bubble. If not . . .

Three feet to my left Shagata stood with his hands clasped behind his back. He said nothing. What was left of his command stood behind him in a loose semi-circle. Five privates and a sergeant. They looked lean, disciplined, ready. Hell, maybe they *were* the elite.

I looked ahead. The two Verdeans paused for a moment on the other side of the bubble, then moved a few feet out onto the slope. They turned and stopped. That far from the field they were blurred, discernible only in outline, and seemed more a single figure than two.

"Pan!"

"I see." I let out my breath. It *was* a single figure. Cirlos. He stood alone on the slope for a long time, unmoving, a statue lacking substance. Then he lowered himself to the ground and with his single hand began to pound upon the ground.

"Last rites," Noriko murmured softly. Her face was drawn, lip muscles tight.

After several minutes Cirlos abruptly

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rose, turned to stare back toward the bubble, then was gone, swallowed by distance and the blurring of the field.

"The Sachem—where is he going?" Shagata asked.

"Back to his village."

"And what the hell are we supposed to do?" The knuckles stood out white on his clenched fists.

"Breathe shallow," I said. I turned away and entered one of the log buildings. Let him get the story from Noriko. I'd had enough of bitter, driven men.

Now if I could still smile at that . . .

Six feet above the ground the air was almost unbreathable. The intense Verdean sun had made the inside of the bubble a foul-smelling sauna, swelling the stinking gases, forcing them lower.

We had taken refuge in the lowest point of the camp, a shallow dip that cut across the plane of the slope. Shagata's Panthers spent the time cleaning their weapons, staring at the repulsor wall, silent, waiting for Shagata's orders. Sweat formed black patches on their uniforms.

"We're going out," Shagata said suddenly. "While we can still fight. There is honor in that. They're good soldiers. They deserve to die fighting."

I gave him a creaking laugh. "That's suicide, Colonel. The Syms will have you for lunch."

He looked at me contemptuously. "We are not afraid to die. What do you prefer to do? Stay here and turn belly-up when the air gets too foul to breathe?"

I shook my head. "Not that, either. There is one last chance. The drug we used to come through the Gate. I have some of it in my footlocker. Cirlos is bringing it back here. The Syms don't harm the lower animals, Colonel."

"What are the odds of that working?" he asked.

I shrugged. "Hundred to one. More, maybe."

He thought about it. He didn't like the idea of the drug. And even if it should prove workable he didn't care for the notion of Cirlos herding us along to the stargate like wayward cattle. He didn't like the idea of being thrown out of Verde.

I watched him. I knew the man, I knew what his answer must be. I had known it hours before, when I'd first prepared for it.

"We're going out. I prefer to die with dignity, Kirst." He made a preemptive gesture with one hand and the Panthers stood as one.

"You're not going to do that, Colonel." I took the pistol out of my pocket and pointed it at him. It was one of his own weapons, a very efficient needle-gun.

He gave a short laugh. "You're going to stop me—with *that?*"

"I'm going to try."

He turned so that he faced me, and his mouth drew down in a deliberate curve.

I said, "I will not kill you, Colonel. I will shoot to injure, to maim. The kneecaps, the ankles, the wrists. No dignity will be left you."

It stopped him.

"If you would fight like a man . . ." he began, and then stopped, staring at me with raw hatred.

I laughed at him. "Is that a challenge, Colonel? Are you challenging a tactician?"

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"As you will."

We locked eyes and the war of wills went back and forth, with no apparent victor. Finally, I tossed the needlegun aside and gave a lopsided grin.

"You win. I accept your challenge. Are you carrying your *luado* knives, Colonel?"

He gave a short nod, his body relaxing ever so slightly.

"Very well. I'll see you in the *kele* ring." I turned on my heel and walked past him up the slope. I didn't wait for him, didn't give him time to think it over. A moment later I heard his footsteps behind me.

The higher we went, the more difficult it became to breathe. I walked steadily, reaching the *kele* ring and striding to its far perimeter. I turned then and showed Shagata the five knives I carried.

"Ready, Colonel?"

He had stopped on the other side of the ring. His face showed no expression, but his chest labored. He produced five identical knives and held them up.

"I'm ready, Kirst."

"Then let's begin."

He had no chance, but then, I'd intended giving him none. His first knife caught me directly under the breastbone and slithered off to the right. I gave him a grin and threw one of my own. It missed by six inches, bounced off a stone, and skittered ten yards downslope.

Honor is nice when you can afford it. To a tactician, honor is a weapon, to be used and discarded as the need arises. Honor had made Shagata follow me to the *kele* ring, was now starving his body of oxygen.

He didn't make it easy, though. His second knife struck me over the heart, slicing through the shirt and furrowing the battle armor I wore beneath it—armor stolen from his own supply room. I grinned again, tapped the tiny valve at my throat, increased the oxygen across my face. I had prepared the rig the night before, cannibalizing one of the emergency units from the med station.

I missed my second throw and watched as Shagata underwent a fit of coughing. He straightened finally, his movements leaden, his body bathed in sweat.

"Damn you, Kirst!" He took a single step forward and brought his arm up and down, the knife leaving his grasp in a flickering curve. It caught the meaty part of my arm, tore through muscle, exited off to the left. I kept my grin, but it was an effort.

Abruptly he had another fit of coughing. This time he did not straighten up. I watched him fall, then waited two minutes, watching him writhe. When I was sure it wasn't a ruse, I crossed to him, leaned near enough for him to draw a breath or two of pure air. Sure that he would live, I lifted him across my back and started downslope.

We waited, and our throats burned. Afternoon heat, cumulative even through the bubble's field, pushed the gases lower and set up convection currents.

I glanced at my watch. Giving us the benefit of the doubt, we had maybe an hour.

As if reading my mind, Noriko left the slight protection offered by a curve in the shallow trench. She sat down beside me and gave me a long searching glance.

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"What if Cirlos doesn't come back? What if he *can't* come back?"

I made a grimace that might pass for a grin. "I forget to ask for a guarantee."

We waited, and outside, the Syms waited too. Sooner or later and in one way or another, we would have to go out and meet them. The alternative was not worth thinking about. Maybe Shagata was right after all, I thought bleakly. Go out with a gun in your hand, with a curse on your lips. Sweat dripped into my eyes and I wiped it away with the back of my hand. It was beginning to hurt to breathe, and beyond the circle of buildings was a fog of grayish air.

"Look there!" Noriko grabbed my arm and pointed at the shimmering wall. I looked that way, stood up, and waved away a feeling of giddiness that threatened to swallow me whole.

Cirlos had returned.

He was stooped now, his teeth bared in an unconscious snarl of pain. He was at his own gargantuan limits.

I went to him, got him seated, his head out of the fog and breathing the slightly less polluted air in the trench.

"What happened at the village?"

He was clutching a small stoppered bottle. He put it down in order to talk.

"Gone. Those who are not dead . . . have run to the hills." His fingers moved slowly, listlessly. Feeling some of his pain, I reached out and put a hand on his good shoulder. I didn't say anything. What was there to say?

Sometime later I asked, "How many Syms are there—outside the bubble?"

"Many, but one is enough. I am sorry, Pan."

"You know of what we talked, this morning? The stargate, and the pattern there?"

"I remember."

"Do you have the strength to do it?"

"I have the strength."

I turned away, picked up the bottle.

I drugged three of Shagata's Panthers first, doubling the standard dosage. When I was done Cirlos looked at them closely, observing their quantum levels.

"They seem different," he signed at last. "All the peaks have leveled out. They seem flat, unformed."

"Let's hope that is how the Syms see them," I said. I glanced at Shagata. "That's as good as we're likely to get. You ready to try it?"

He shook his head and took his hand out of his pocket.

This time *he* had the gun.

His eyes burned at me. "Be careful, Kirst. Don't try me. Put the bottle down, then step back."

"What are you doing, Colonel? This your way of getting even?"

"In a way." He gave me a cold smile that never reached his eyes, then gestured with the gun. I put the bottle down and backed up a step or two.

"Fine," Shagata said, when Noriko picked up the bottle. "Now drug Dr. Kirst."

I stood stoically while she administered the dosage. When she was done I looked at her and then at Cirlos. I wanted to remember that apple-green face, wanted to take that much away with me.

"Banzai," I thought I heard Shagata say.

Then my senses started to waver and the universe went away.

I woke up and immediately wished I hadn't. The wind was howling, trying

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to break me in half. My head felt like a giant drum. And I was freezing.

I was no longer on Verde.

I looked around and saw six Panthers. About thirty feet to my left was a ragdoll form I knew must be Noriko.

I looked for Shagata, but he wasn't there. Nor would he ever be.

The stargate was closed too. At least the one leading to Verde. No one would be going for awhile.

Some day, though . . .

"He ordered us out," Noriko said later, nursing a scalding cup of tea in the lodge below the Gate. She stared past me into space. "The last I saw of him he was putting on battle armor."

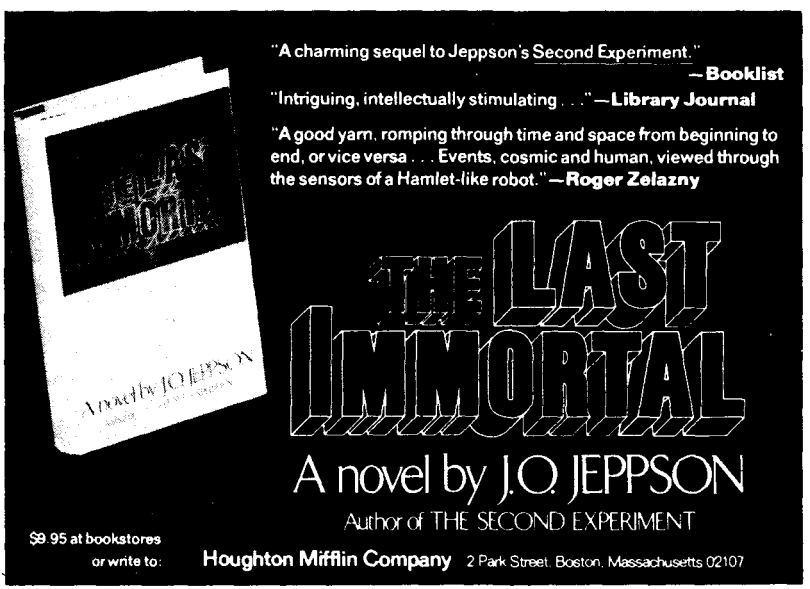
"The final gesture," I said, sipping brandy. "He went out to face the Syms, after all."

She managed a tiny smile.

"He was a samurai," she said. "A man of honor."

I thought about Cirlos, and Shagata, and Honor. I tried hard to feel cynical, but somehow it didn't work. Was *bushido* alone a human trait? It was all, it seemed, a matter of definition.

I thought about it, for a long while. Then I raised my glass, and toasted the samurai. ■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DEMYTHOLOGIZING THE BLACK HOLE

BY
RICHARD MATZNER
TSVI PIRAN
TONY ROTHMAN

INTRODUCTION: "TRUTH IS FOR THE MINORITY."

With the release of the Disney catastrophe, general interest in black holes has peaked. The release of this film also signals a critical overdose of misinformation to which the public has been exposed. We read statements like: "The pull of a black hole's gravity is so strong . . . time is stopped and space does not exist. . . [A black hole's discovery] would unravel the mystery of both the universe's creation and eventual destruction."

Such blatant idiocy induces the public conception of black holes as monsters which gobble up all the matter in the universe, as miracle workers which can solve all our energy problems, as gateways to other universes, and as time machines. This conception is profoundly misplaced. The same theory which predicts the black hole's existence also predicts that each of the preceeding properties has severe limitations or does not occur at all. The very existence of black holes is itself debatable; within our own galaxy only one not-yet-conclusive candidate for a black hole has been found to this date, the x-ray source, Cygnus X-1.

Thus, it strikes us as bordering on the ridiculous to use black holes as an explanation for every property of known space. Of course, there are mistakes and there are mistakes. Some involve subtle points, and physicists advance their own field only by making lots of them. The layman cannot be faulted for doing the same. Nonetheless, most of the nonsense written about black holes stems from an ignorant exploitation of a sublime idea, and a lack of interest in the pursuit of knowledge. As we will see, the theoretical properties of black holes are in themselves so remarkable that there is no need to exaggerate them in an attempt to capture the public's attention. Bearing this in mind, we now examine some properties of black holes—without exaggeration.

CLASSICAL BLACK HOLES AND CANONICAL MISCONCEPTIONS.

Visualize a black hole. Most of us, encumbered by the limits of imagination, will visualize a small, black sphere floating in space among the stars. We probably think of this ball as a highly compressed solid, somethng like cold iron but unimaginably more dense. Unimaginably high density, we assure ourselves, produces an unimaginably great gravitational field. We further imagine the field to be so strong that all surrounding matter is pulled into this tiny sphere, never to escape again. Light itself cannot avoid the same fate; fleeting, ephemeral, yet once light enters this strange object it is trapped forever by

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gravity. Thus, the "black hole"; absolutely black since light cannot be reflected from it to show its existence.

The question is, is this picture a description of anything? The answer is not straightforward but requires more precise concepts, caveats, and "yes buts." In attempting an answer, one should first keep in mind that relativists, peddlers of gravitational theories, distinguish between several types of black holes. There is the basic, Schwarzschild black hole which is spherical, electrically uncharged, and does not rotate; there is the Kerr black hole, which rotates and is not spherical; and there is the Reissner-Nordstrom black hole, which is spherical and non-rotating, but contains an electric charge. (The holes are named in honor of the mathematicians who worked out their theoretical existence.)

These three types, without additional complications, are lumped under the heading "classical black holes" to distinguish them from "quantum black holes." A quantum black hole is any black hole, including one of the above types, in which it is necessary to take into account the fact that light, for instance, consists of indivisible units called quanta. For light the quanta are photons; for the gravitational field itself the quanta are gravitons. Thus, we can have quantum Kerr black holes, quantum Reissner-Nordstrom black holes, and quantum Schwarschild black holes. But for now limit ourselves to classical black holes.

Evidently, the above mental picture corresponds—more or less—to the basic Schwarschild black hole. However, the emphasis in the previous sentence is on the "more or less," specifically on the "less." We will now begin to give a more accurate description of a classical black hole, keeping in mind that specific details may vary from one category of hole to the next.

The classical, astronomical picture of a black hole is one of a remnant left over by the collapse of a massive star; the examples typically used have about ten solar masses. The escape velocity from the surface of the black hole exceeds that of light; indeed, this is the definition of both a "black hole" and its "surface." The surface of a black hole is called the *event horizon*. Now, we know that no physical object can move faster than light, so nothing whatsoever, having fallen across the event horizon of a black hole, can come back out through that horizon.

A ten-solar-mass black hole has a radius of about 30 kilometers, roughly the size of New York City. It is this typical example of a small, collapsed object with a gravitational field so strong that not even light can escape, which has conjured up the vision of black holes as extremely dense objects which grab anything in the vicinity. In fact, the density of the ten-solar-mass hole (density is the mass of the hole divided by the volume enclosed within the event horizon) is of order 10^{15} grams per cubic centimeter. This seems a very high density by everyday standards (the density of iron is only about 8 grams per cubic centimeter) until we realize it is comparable to the density in the nuclei of atoms. Each one of us is composed of particles of this sort of density.

In any case, a black hole does not

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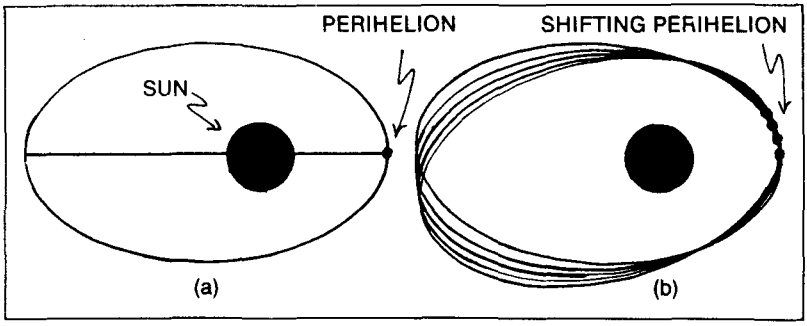

FIGURE 1. (a) A non-precessing elliptical orbit. The perihelion, or closest approach to the sun, remains at the same point in space after each orbit.

(b) A precessing orbit. The perihelion changes position slightly after each orbit around the sun.

have to be so dense. The basic black hole equations show a very simple relationship between the size and mass of a black hole and the density. As the radius of the hole or its mass is increased, the density goes down. Thus, by making a black hole large enough or massive enough, we can make the density as low as we want. Actually, there is no reason we could not make a black hole out of air. Such a hole would have a radius of about 30 billion kilometers, roughly ten times the size of our solar system. If one entered this black hole, one would hardly feel a thing, but after a few days life would become uncomfortable—as one approached the singularity.

While we will not talk much about singularities in this article, we should mention that the singularity in the center of the black hole is the place where all the matter eventually ends up. The density at this point is infinite, which introduces a "yes but" into the above remarks. The density we have been discussing is the *average* density of the hole and, strictly speaking, one can only talk about the average density from outside the horizon.

At the surface of the air-bag black hole, the gravitational acceleration would be about 100 times the acceleration we feel on the surface of the earth, or roughly the same as the gravitational acceleration on the surface of the sun. A larger black hole, made out of hydrogen, would have an even lower surface acceleration. We see then, the gravitational acceleration of a black hole is not always overwhelmingly large.

If the gravitational field is so weak, the question immediately arises, why can't one escape by firing a rocket engine. The answer is somewhat tricky. We know that by accelerating even at very low accelerations, say .1 gee, we can eventually reach huge velocities. Similarly, even the weak acceleration produced by our air bag will eventually

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accelerate objects to high velocity. In fact, by the time an object has fallen to the event horizon of any black hole, it is moving at the speed of light, inward. If the falling object wants to remain even stationary at the horizon, it must then move with the speed of light, outward. The principle of relativity says that nothing can move faster than the speed of light. Therefore, there is no escape. Acceleration is somewhat irrelevant to the problem; the speed of light simply cannot be exceeded.

FANCY FREE: ORBITS AROUND BLACK HOLES.

Related to the idea that a black hole possesses a strong gravitational field is the misconception that nothing can get remotely near the hole without being gobbled up. A good illustration of this nonsense is in the Disney film where the ship, the *Cygnus*, seems to require an antigravity field to prevent it from falling into the black hole. The filmmakers ignore the fact that, at distances greater than about 10 times the radius of the black hole, ordinary orbital mechanics—known since the time of Newton—is applicable. For example, if the sun were suddenly replaced by a black hole of equal mass, the orbits of the planets would not change by the width of an ant's eyebrow. Admittedly, it would get dark, but that is another story.

This brings us to the first important rule of black hole orbital mechanics: **At large distances, the fact that we are in orbit around a black hole is irrelevant.** We may consider the black hole to be a spherical mass concentration producing an ordinary, Newtonian gravitational field, like that of the earth or the sun.

As the orbital radius approaches 10 black hole radii (300 kilometers for the 10 solar mass case), general relativistic effects become very important. The proverbial *curvature* of space and slowing of time come into play. Such distortions of space and time manifest themselves in such effects as perihelion shifts in non-circular orbits. To understand perihelion shifts, we recall that Newtonian orbits are steady ellipses around the central body. The satellite's point of closest approach, the perihelion, remains at a fixed point in space. We say, in this instance, space time is flat or Newtonian. (See Figure 1a.) When curvature of spacetime is more significant, the point of closest approach pivots around the central body with each orbit of the satellite. (See Figure 1b.) This pivoting is called a "peri*helion* shift" when speaking of orbits around the sun, a "peri*astron* shift" when speaking of orbits around stars in general, and a "peri*barythron* shift" when speaking of orbits around black holes. ("Barythron" is the Greek name for a a deep pit in Athens into which condemned criminals were thrown.)

Because the shift is a cumulative, continuous effect, it can be detected even in satellites far from the central body, if a sufficiently long time is spent on the observation. For instance, Mercury's perihelion shift is about 42 seconds of arc per century, a very small effect indeed. We can say that, as far as Mercury is concerned, the spacetime curvature caused by the sun is hardly noticeable. Spacetime is very nearly flat. Close to a black hole, on the other

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hand, the peribarythron shift becomes very important. At ten black-hole radii, it amounts to about 70 degrees per orbit!

Even closer to the black hole, circular orbits become unstable. A small deviation inward leads to a continuing spiral into the hole. For a Schwarzschild black hole, the point of instability comes at 3 black-hole radii (i.e., at 2 radii from the surface). This does *not* mean anything which falls within 3 radii of the black hole is irretrievably sucked in. One may still swoop down from a very large distance, down to 2 radii, and return to infinity, just as a comet approaches and then recedes from the sun. And this approach can be made without engines, again, like a comet. If rockets *are* employed, one can come almost all the way down to the Schwarzschild radius, i.e., the horizon, and out again. Alternatively, one can continue to orbit around the hole below 3 radii; but, in this instance, rockets must be fired to maintain position. What is *not* allowed in this region are free, uncorrected orbits like those of satellites and skylabs around the Earth.

In the Disney film, the featured hole was not Schwarzschild, but a rotating or Kerr hole (even though the computer graphics shown during the credits were mistakenly those for Schwarzschild). For a Kerr hole, the point of the last stable orbit depends on how fast the hole is spinning, but the results are comparable to the Schwarzschild case; instabilities set in between 1 and 9 radii. Thus, the *Cygnus* should not need "antigravity devices" until very close to the hole indeed. On the other hand, as far as 1000 radii from the black hole, the *Cygnus* would be orbiting with a period of about one second. Admittedly, this may be why the antigravity device was posited in the first place—to dispense with orbits altogether. On the third hand, we doubt the filmmakers thought this far.

Since we have been speaking of orbits, it is appropriate at this time to introduce the second important rule of black hole orbital mechanics: **The principle of equivalence still applies.** This fact seems to have escaped the attention of almost all moviemakers and writers. The principle of equivalence states that any body in a free orbit or in free fall does not experience the force of gravity. We might say, "Falling free or orbiting 'round, equivalence says gravity not found." Examples of this are encountered in everyday life: When we dive off a diving board we feel weightless. When an airplane drops suddenly, those in it feel momentarily weightless. Astronauts in orbit around the Earth are *not* weightless because gravity has been turned off above the atmosphere; rather, they are falling around the Earth, continually diving off the board, if you will. Under these circumstances, the principle of equivalence says that gravity is not felt.

This is a very important point which applies to *any* situation near a black hole when rockets are *not* being fired: orbiting on a stable orbit; orbiting on an unstable orbit (when not correcting for instabilities); spiraling in; swooping down like a comet; or just falling in. In these cases, one does *not* suddenly feel heavy near the hole. On the contrary, one feels weightless, as if he were orbiting the Earth or diving into a swim-

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ming pool

There is a complication to be introduced here. When an object comes close to a black hole, *tidal* forces can become extreme. As their name implies, tidal forces are those forces which raise tides on the surface of the Earth. Because one side of the Earth is slightly closer to the moon than the other side, the near side feels a slightly greater gravitational attraction to the moon than does the far side. Thus, we get a "tidal bulge"; the Earth is stretched out in the direction of the moon. (Some readers may know there are actually *two* tidal bulges. We do not pause to discuss why this occurs.) We might say, with fair accuracy, that tidal forces are those which arise from the *difference* in the gravitational field between two points. The greater the difference, the greater the tidal forces.

Consider a man in a spacesuit orbiting a black hole. He is in free fall, so by the previous discussion, feels perfectly weightless. However, the feet of the astronaut are slightly closer to the black hole than is his head. Therefore he experiences tidal forces: his feet are being pulled toward the hole more strongly than his head. As a result, the astronaut is stretched. One might think, because a man is so small, that the difference in the gravitational force between his head and his feet cannot be very large. After all, gravity does not decrease *so* fast over a couple of meters. This is not true. Near a white dwarf, neutron star, or black hole, tidal forces can be immense. If he is orbiting a one-solar-mass body at a height of 10 kilometers, the tidal forces on our astronaut are approximately ten million times the force the Earth is, at this moment, exerting on us. That is, while the Earth is pulling us to its surface with a force which, by definition, is equal to our weight, the astronaut is being ripped apart by forces about ten million times stronger. This particular example has roughly the conditions presented in Larry Niven's story, "Neutron Star." It is, alas, ludicrous to think the hero could save himself by curling up into a ball at the ship's center. More likely, he would end up spread over the walls, the consistency of pink applesauce. Perhaps, we have estimated, if he initially started out as a piano wire for triple high C, he might have survived.

Still, a caveat is in order here. Near black holes which are large enough, like our air bag, tidal forces become totally insignificant, much less than even those tidal forces we feel on Earth. Thus, no shredding at all will take place near these holes until one falls close to the singularity. At the singularity, in all black holes, the tidal forces are infinite.

To sum up this section, we reiterate that it is the tidal forces which wreck spaceships near black holes, not the simple fact of strong gravity. And, as just mentioned, for very large holes, over about 10^5 solar masses, even this does not happen. As an astronaut orbits a black hole, he feels as weightless as if he were floating amid the clouds on a fine spring day. Near a typical black hole, though, his head is being wrenched from his feet by forces which make the bed of Procrustes amateurish by comparison.

BEING AND NOTHINGNESS: BLACK HOLES AS THE END OF SPACE AND TIME.

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Two astronauts are orbiting a ten-solar-mass black hole. Richard, having seen one too many bad science fiction films, decides to end it all by taking the fateful plunge. He jumps. Tony, curious to see the demise of his dissertation advisor, decides to clock Richard's fall to the event horizon. "Time is on my side," Tony chuckles to himself, but he has a surprise waiting for him. As Richard approaches the event horizon, he seems to fall more and more slowly. Tony knows this because Richard is carrying a green, flashing beacon. The time interval Tony measures between each flash of the beacon is becoming longer and longer. In addition, he is startled to find that the flashes are growing much redder and dimmer "as time goes by." Tony grows impatient, but to no avail. The fall seems to take forever. Tony dies of old age muttering, "*Veritam dies aperit*," but Richard has still not reached the event horizon. Tsvi arrives in his space shuttle to take over the observations but suffers Tony's fate. He too grows old watching Richard's beacon flash ever more slowly and redly. With his dying breath, he entreats, "Stand still you ever-moving spheres of heaven/That time may cease and midnight never come." Tsvi's descendents have no better luck. Richard fades away completely just as he reaches the horizon, after a truly infinite amount of time. The clock has stopped.

Richard, on the other hand, realizes, "Time and tide wait for no man." He does not notice his beacon flashing any more slowly than normal, nor does he notice it growing redder and dimmer. He reaches the event horizon after a perfectly finite number of flashes. From that point, he crosses the event horizon, although he does not realize he has done so, and continues his plunge to the singularity at the center of the black hole. Of course, Richard is ripped apart by tidal forces long before he gets there, but his dispersed atoms reach the dreaded singularity in a rather short amount of time—about 10^{-4} seconds as measured by his flashing beacon.

As well as a mild discrepancy between two clocks, there is a moral to this fable: Relativity is called relativity because relativity is truly relative. The question, "Does time stop at a black hole?" is meaningless as it stands. We can say, "To an observer in a spaceship, an object falling into a black hole takes an infinite amount of time to reach the event horizon." But we can also say, without contradiction, "To an observer falling into a black hole, the time required to reach the event horizon is quite finite." When posing relativistic questions, one must be careful to specify about whom one is talking, or else one runs the risk of lapsing into gibberish.

The slowing down of Richard's beacon-clock (as measured by Tony and Tsvi on the ship) and the reddening of the light are two aspects of the same effect. The curvature of spacetime associated with the gravitational field around the black hole actually causes time to flow at different rates. Just as the flashing of the beacon can be thought of as a clock, so can the oscillations in a light beam, or the movements of atoms in the beacon motor. *Everything* is slowed down from the point of view of Tony or Tsvi on the ship. The slower oscillations of the light

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are interpreted by Tony's eye as a reddening of the light, and since light is being emitted from the beacon at longer intervals, fewer photons (light particles) reach the eye per unit time. The combination of these effects causes the excessive dimming of the beacon.

Richard, however, falling into the hole, is subject to the principle of equivalence. (Falling free or orbiting 'round, equivalence says gravity not found.) He does not feel any gravity on him or on his beacon. As far as he is concerned there is no gravity to slow down his flashes and everything proceeds as normal, with the exception of tidal effects.

It is important to keep in mind that all these effects occur around any gravitating body, the sun for instance. The only difference is in the magnitude of the effects, which will be much greater around a typical black hole than near the sun or the Earth.

To conclude this brief discussion of space and time near a black hole, we would have wished to comment at length on the quotation found at the beginning of this article, to the effect that, a black hole is a place where "space does not exist." This, unfortunately, has proven to be impossible because we have entirely failed to discover in that statement any meaning whatsoever.

THE COSMIC WHIRLPOOL: KERR HOLES AND PENROSE PROCESSES.

Present energy dilemmas have made popular the idea of extracting large amounts of energy from black holes. The attraction of this idea is not hard to see. We are all familiar with the large flywheels used by electric companies in their power plants. These huge flywheels store *rotational energy*. By coupling the flywheel to a generator, we are transforming the rotational energy into electricity for use in home and industry. In doing so, we have extracted the rotational energy from the flywheel and, as a consequence, it slows down.

Now, we have mentioned that Kerr black holes rotate, much like the above flywheels. The rotational energy of a rapidly rotating solar mass Kerr hole is about 10^{54} ergs. At the Earth's present rate of energy consumption, 10^{54} ergs would last approximately 10^{27} years, or about 10^{17} times the present age of the universe. This is a long time.

The question naturally arises, can the rotational energy of a Kerr hole be extracted. If it could, we would expect the black hole to slow down like the flywheel. When no further energy could be extracted, the black hole would no longer be a spinning Kerr hole; it would be a non-rotating Schwarzschild hole. In 1969, the British relativist, Roger Penrose, showed that extraction of the rotational energy of a Kerr hole is possible. Immediately after his suggestion appeared, others further proposed that the Penrose process might be used by an advanced civilization to tap the energy of black holes. From there, science fiction took over. The basic idea was used in *Gateway* by Fred Pohl. Indeed one of us (T.R.) succumbed to the temptation to use the idea in his novel, *The World Is Round*. Unbeknownst to T.R., T.P. and others were at the same time proving how difficult the Penrose process was to implement.

To understand the Penrose process further, we must first talk in more detail

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about Kerr holes. The rotation of a Kerr hole causes a "whirlpool in space." This whirlpool is actually quite similar to an ordinary ocean whirlpool except that, instead of water whirling around, it is spacetime itself swirling around the black hole. If a space traveller is caught in this whirlpool, he is dragged around the black hole exactly as he would be dragged around the eye of the vortex if caught in an ocean whirlpool. If the space traveller wanted to remain stationary, he would have to fire his rocket engines to overcome the spacetime dragging. Again, this has a marine analogy. A swimmer must swim against the current in the vortex if he wishes to remain in the same place.

We should note that this dragging is not unique to black holes but, according to relativity, occurs around any rotating body. In fact, a team of experimentalists at Stanford, led by Francis Everitt, is planning to measure the dragging force caused by the *Earth's* rotation. This measurement will be carried out by a satellite to be launched by the space shuttle. The dragging caused by a tiny body like the Earth is really very small. While the Stanford satellite orbits the Earth, the gyroscopes on board will be tilted a slight amount by the drag. After a full year, the cumulative angle of tilt will be less than a second of arc, about the angle subtended by a penny as seen from a distance of a kilometer.

Although the effect due to the Earth is small, around a black hole the dragging can become enormous. In fact, beneath a certain distance from the hole which is termed the "stationary limit," no matter how hard one fires his rocket engines against the current, the dragging cannot be overcome and one is inevitably swept around the hole. This notion can be made more precise. Consider an observer on a "space buoy" being dragged passively around the hole. To him, someone in a rocket trying to overcome the dragging will appear to be moving in the opposite direction. At the stationary limit, this rocket will appear to the observer on the buoy to be moving at the speed of light. From a space station far above, however, the rocket is just managing to fight the current and remain stationary, hence the name "stationary limit."

We recall the famous words of the Red Queen: " . . . it takes all the running you can do to keep in the same place. If you want to get anywhere else, you must run at least twice as fast as that." Unfortunately, one cannot run any faster than the speed of light. If she is unlucky enough to fall beneath the stationary limit, even the Red Queen will never be able to stay put and will be dragged around the hole along with space buoys, rockets, and everyone else. (See Figure 2.)

The region between the stationary limit and the event horizon is called the "ergosphere." "Ergosphere" was coined by Wheeler and Ruffini from the Greek word "ergo" meaning "work." It is in the ergosphere that the Penrose process takes place. (See Figure 3 for the relationship between the horizon, ergosphere, and stationary limit.)

Consider a rocket orbiting in the ergosphere. It ejects a load of garbage *against* the current (like the Red Queen). Although this garbage is swept around the hole—since it *is* beneath the stationary limit—it is "struggling against

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the current." One can imagine that an object moving on such a "counterrotating" orbit would exert a braking force on the hole and therefore slow it down in the same manner as we slow a flywheel. Thus, some of the rotational energy is lost and is, in fact, transferred to the ship as a recoil effect. (Think of a gun shooting a bullet. The recoil is greater than normal due to the presence of the rotating black hole.) This energy would be manifested as a greater kinetic energy of the ship, that is, a higher velocity. The ship could then leave the ergosphere with more energy than it had to start with, to be used elsewhere.

However, the matter is not so simple. The ejected garbage will be captured by the black hole, adding its own mass to the original mass of the hole. Since $E = mc^2$, by losing the garbage we are losing energy to the hole. If the amount of energy lost to the hole is greater than the amount of energy gained by braking the hole, we have a net loss of energy. No extraction has taken place.

Nonetheless, if certain conditions are

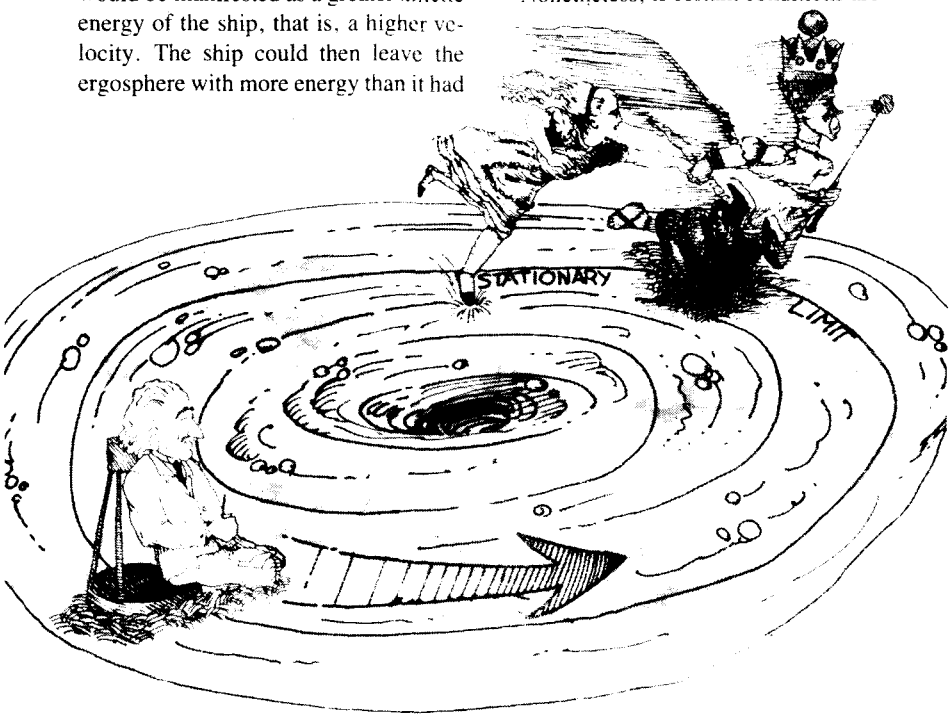

FIGURE 2. An observer on a space buoy, being passively dragged around the black hole whirlpool, sees the Red Queen at the stationary limit running at the speed of light. From a space station far above, however, she is seen as just managing to remain at the same place. (Note: This drawing is not to be taken too literally. One does not actually see a spacetime whirlpool around a black hole.)

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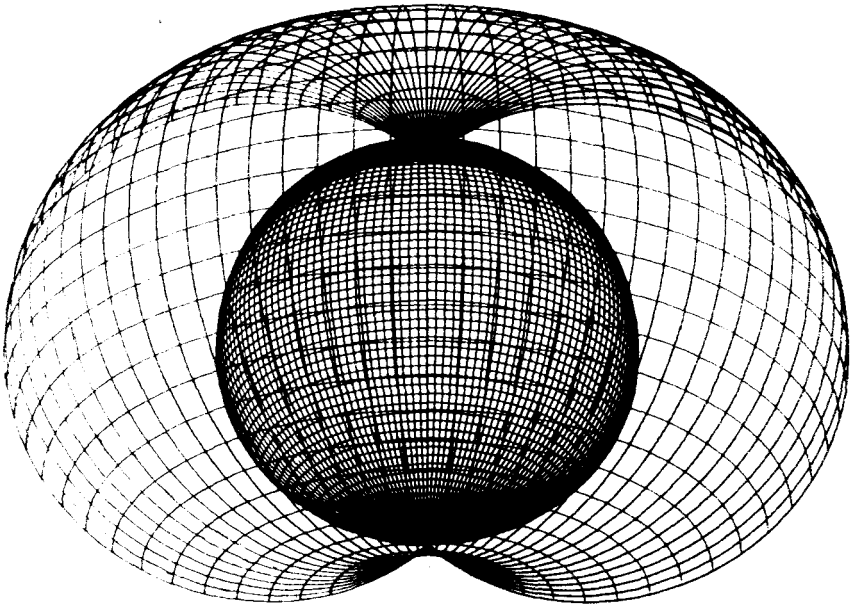

FIGURE 3. A computer generated picture showing a cutaway view of a Kerr hole rotating at the speed of light. The outer surface is the stationary limit; the inner surface is the event horizon itself; and the region in between is the ergosphere. The view is from 26.5° above the equator, which accounts for the slight distortion of the inner sphere. We wish to thank Nigel Sharp for generating this picture. (Important note: All previous textbook vies of Kerr holes in Boyar-Lindquist coordinates without the cusps shown here are incorrect.)

met, the energy balance will be favorable. That is, if the garbage is ejected at sufficiently high velocity onto a counterrotating orbit within the ergosphere, the net result will be an energy gain. Any orbit which meets these requirements is termed an "energy extraction orbit." We emphasize that they only exist within the ergosphere. Note also that it is the orbit which is important, not what we eject. Therefore, it makes sense to use garbage, since this eliminates waste disposal problems as well.

The Penrose process is best illustrated by the machine in Figure 4, adapted from the text *Gravitation*, by Misner, Thorne, and Wheeler. An advanced civilization builds a huge shell around a Kerr black hole. Space shuttles loaded with garbage enter the ergosphere. They eject their payloads in the manner already described, receive a giant dose of energy which boosts them to huge velocities, and return to the surface. They are caught in the arms of a giant generator which converts this kinetic energy into electricity for use over the shell.

Even if our supply of garbage is limited to one Earth mass, this is enough

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to power the Penrose process for about 10^{21} years, or 10^{11} ages of the universe, not an insignificant amount of time.

Two technical details make this extraordinary picture somewhat less optimistic. The first difficulty is jettisoning the garbage onto an energy extraction orbit. The second difficulty is getting the boosted shuttle out of the ergosphere without being captured by the black hole. We can better understand these problems if we pretend we are on a shuttle, the *Penrosia*, whose mission is to go into the ergosphere, dump garbage, and return to the shell with as much energy as possible. The crew is fresh out of Starfleet Academy and so learns

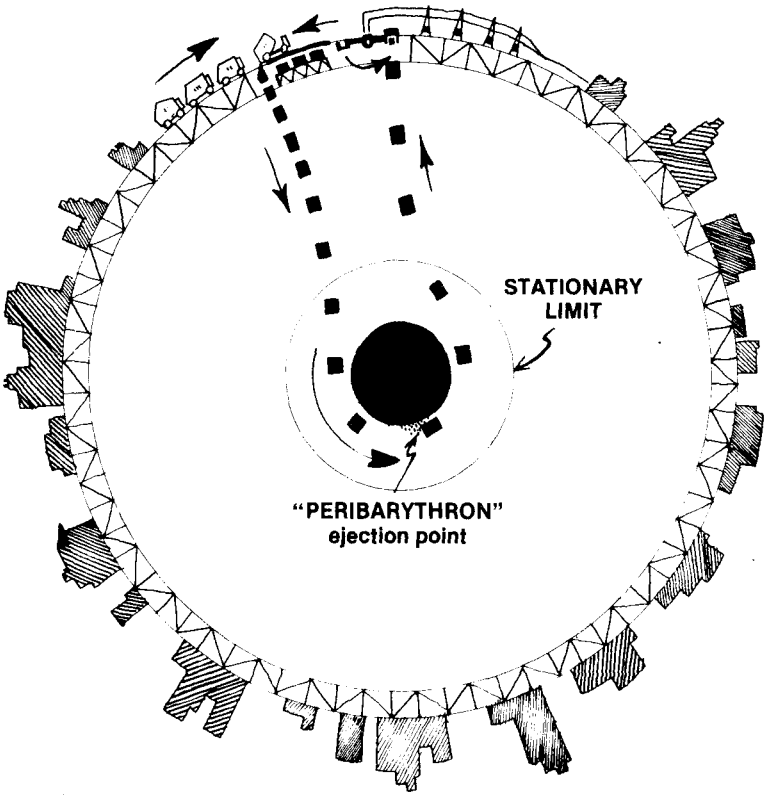

FIGURE 4. The Black Hole energy extraction machine. Shuttles from the shell enter the ergosphere, jettison garbage onto an energy extraction orbit, return to the surface with a gain in energy to power a giant generator. The additional energy comes from the energy content of the garbage and from the rotational energy of the black hole. In this process, the hole slows down.

From GRAVITATION by Misner, Thorne and Wheeler, W.H. Freeman and Company 1973.

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by the dangerous method of trial and error.

We have entered the ergosphere. Because fuel supplies are limited, the Captain has turned our engines off. The *Penrosia* is now being passively dragged around the black hole's whirlpool like a space buoy. Since we are in orbit, we feel weightless. An inexperienced space cadet attempts to eject a load of garbage onto an energy extraction orbit simply by throwing it out by hand. To our dismay, we find that the garbage only follows the shuttle along, very gradually drifting away (exactly like what happens with garbage jettisoned from a space capsule in Earth orbit). The bundle is certainly moving too slowly to be on an energy extraction orbit; this garbage would hardly brake a snail, let alone a black hole. Determined, the crew tries again, this time firing the garbage out of a cannon. Now the garbage vanishes into the distance, but when our sensors plot the trajectory, we find that the garbage is still not moving fast enough to be on an energy extraction orbit. Many such attempts are made, each using increasing amounts of power. They all fail. Finally, the frustrated crew of the *Penrosia* succeeds in shooting a thimblefull of garbage onto an energy extraction orbit. They calculate the velocity of the thimble and find it to be nearly the speed of light. This has been accomplished only by momentarily diverting the full power of the shuttle's reactor engine, just for the purpose of launching the thimble. When the energy balance is computed, the crew discovers that the energy generated by the reactor on board was almost equal to that gained by ejecting the garbage. However, they have gained some energy and tired but happy, prepare to leave the ergosphere.

At this moment, the Captain realizes he has made a fatal mistake: He has forgotten Newton's Third Law. When a rocket ejects fuel from its engines, the rocket is propelled in the opposite direction. By ejecting garbage from the *Penrosia*, the crew has inadvertently boosted the shuttle onto a new orbit. The ship's computer makes a quick calculation. To the Captain's horror, he realizes that the new orbit will lead the *Penrosia*—and us—directly into the black hole. The Captain guns his engines. After expending all the energy gained by launching the thimble, we barely escape to the surface, tired but unscathed.

What happened?

Recall our previous discussion. The "sufficiently high velocity" mentioned earlier for an energy extraction orbit, turns out to be nearly the speed of light. That is, the garbage must be like the Red Queen, moving at nearly the speed of light with respect to other objects in the whirlpool. To accelerate an object to the speed of light requires stupendous amounts of energy which, in this case, must be generated on board. It turns out that we must convert a large part of the garbage into energy in order to boost what little remains to the velocity of light.

The second problem was to get the energy out. Most orbits within the ergosphere intersect the black hole. The *Penrosia* boosted herself onto one of these orbits and to escape it required also a stupendous amount of energy. In most cases, anything gained by the ejec-

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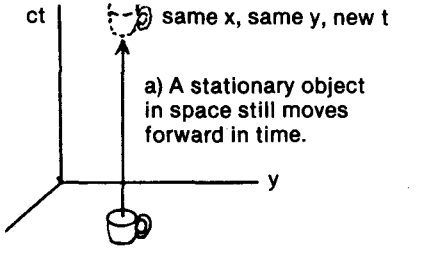
tion is lost in trying to escape. This second problem, as it turns out, can be overcome only by jettisoning the garbage exactly at the peribarythron of the orbit. Then one escapes to the surface with what little energy was initially gained by the ejection.

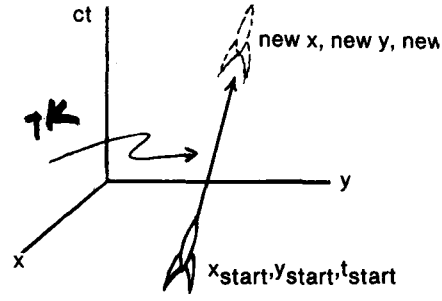
We have just seen that to get an appreciable amount of energy out of the hole requires that matter be converted on board the shuttle with essentially 100% efficiency. Then by ejecting this "energy beam" (photons), we get an additional 20% boost from the hole, for a grand total of 120% efficiency. Not bad; but since this requires almost 100% conversion efficiency to begin with, the Penrose process might not be worth all the trouble. It can, however, be used for a more efficient energy conversion process than is available on Earth. That is, it turns out we can use a modified Penrose process to extract energy from matter with up to 10 times efficiency of the 1/2% of hydrogen bombs, the most efficient process known at present. Unfortunately, we do not have space in this article to discuss such modifications, and a more detailed discussion will have to wait for another opportunity.

"I EXPECT TO PASS THROUGH THIS WORLD BUT ONCE": STAR GATES AND TIME MACHINES.

Any interstellar empire or commercial consortium need a means of rapid communication and transport. The smuggler Han Solo made the "jump into hyperspace" and emerged at his destination some time (12 parsecs!?) later. Space warps and star gates are a staple of science fiction.

Relativity, as already mentioned, describes gravity as a warping of space and time, and a black hole is the result of the strongest possible curvature. It is not surprising, then, that science fiction has latched onto black holes in an attempt to make space warps sound more plausible. To some extent, it is our own fault; in idealized situations, relativists have discovered the tantalizing possibility of a "star gate" lurking in black holes. Unfortunately, the situation has gotten out of hand and almost





b) A moving object has a tilted world line.

FIGURE 5. Basic spacetime diagrams. The time scale is plotted vertically. The label "ct" is just to get the units correct.

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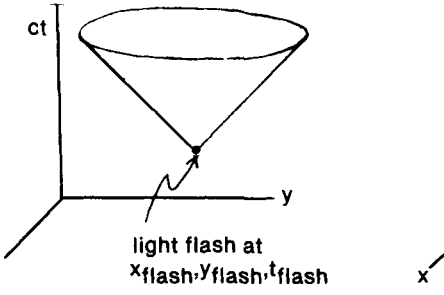
everyone has chosen to ignore work started as far back as a decade by Penrose and Floyd, which shows that "star gates" cannot be realized in practice.

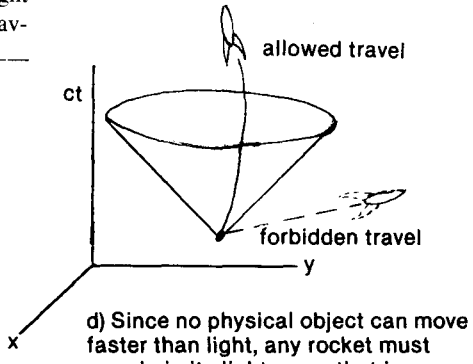
To discuss this problem, we will need to back up and fetch some concepts not yet introduced in this article. Relativity is, in a sense, a study of geometry, but not simply the ordinary Euclidean kind which we all learn in high school. For one thing, space and time have been combined into a 4-dimensional spacetime. To pursue this point briefly, let us refer to Figure 5. Here, only two spatial directions are shown, x and y (east-west and north-south if you like) and the time direction, labeled by ct. Time increases upward. From the explanations accompanying Figure 5, we distill four rules for understanding these diagrams: 1) An object stationary in space still moves through time. Its path through spacetime, or *worldline*, is therefore a vertical line; 2) An ordinary, moving object, like a rocket, has a world line which is tilted at less than 45 degrees from the vertical; 3) Light travels along 45 degree lines; 4) Traveling on a worldline tilted greater than 45 degrees from the vertical is prohibited because this is motion faster than the speed of light.

This type of spacetime diagram has its defects. The most serious one is the difficulty of showing things which are very far apart—it is especially difficult to map an infinite universe onto a finite piece of paper. Nonetheless, with sufficiently vigorous squeezing, one can actually distort the outer edges of the universe in such a way that we can fit the entire infinite universe onto a finite piece of paper. We can even retain certain features of the real universe. The one feature which is usually kept is the 45 degree angle which represents the trajectory of a light beam. A diagram like Figure 6 results.

All this is in preparation for a discussion of star gates and time machines based on black holes. Recall our discussion of tidal forces. We mentioned that in a simple Schwarzschild black hole, tidal forces on an infalling object



c) Light spreads out from a flash in all directions at 45° angles, forming a "light cone."



d) Since no physical object can move faster than light, any rocket must remain in its light cone; that is, the rocket must have a world line tilted at less than 45°. A tilt greater than 45° is motion faster than light and is forbidden.

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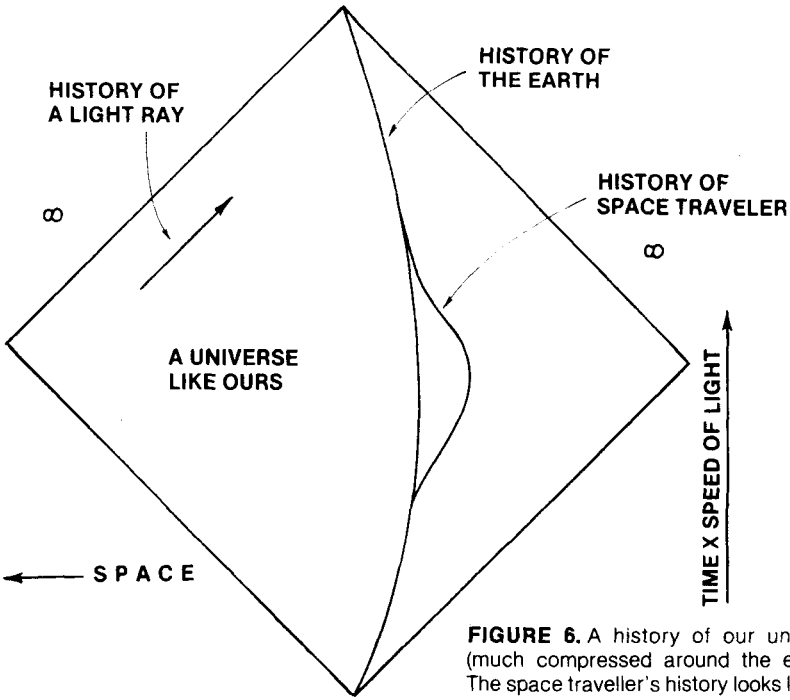

FIGURE 6. A history of our universe (much compressed around the edges). The space traveller's history looks longer, but according to the curious geometry of spacetime, actually amounts to a shorter time than passes on Earth between his departure and return.

(remember Richard's plunge) become greater and greater until they become infinite at the singularity. Well, inside a rotating Kerr hole, or a charged Reissner-Nordstrom black hole, this is not necessarily true. In fact, the theory states the following: *Unless the black hole has exactly zero charge and zero rotation, it will allow an object, say a spaceship, whose own gravitational effects are negligible, to enter the black hole at a speed slower than light, avoid the singularity, and leave again by an exit different from the surface through which it entered.* The different exit surface gets around the immediate objection that nothing which falls into a black hole can escape again; it can, but not through the same surface through which it entered.

If the exit surface is not the same as the event horizon by which we entered, then where does the spaceship end up? Figure 7, a spacetime diagram drawn for a Reissner-Nordstrom black hole, attempts to explain the situation. The two diamond shaped regions are like Figure 6 and thus both represent infinite universes. The diagram therefore shows two universes connected by a black hole tunnel. (Again, we are plotting space horizontally and time vertically.) The

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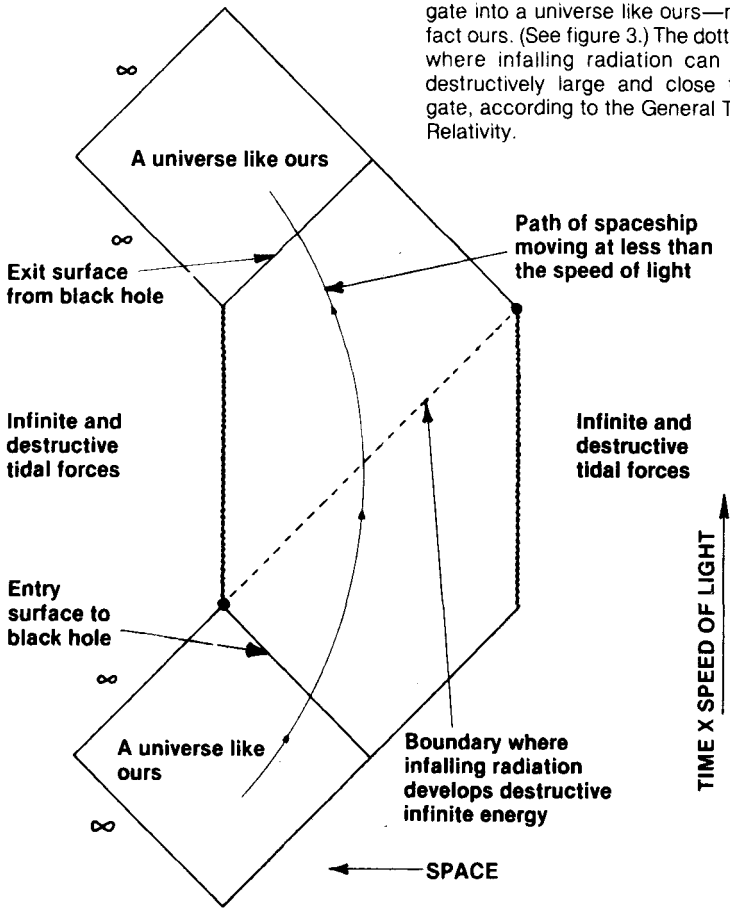
curve shows the history of the infalling-spaceship-cum-observer as it travels through the hole.

A complicated figure indeed. The intrepid traveller falls inward. The first 45 degree line he crosses is the event horizon of the black hole; nothing can re-exit via this surface once having crossed it. The jagged lines represent the singularities, where tidal forces are infinite. (Remember, singularities are moving forward through time; therefore on this diagram they appear as vertical lines.) But the traveller can avoid these reefs; just by coasting he passes at a safe distance. When he emerges from the black hole, he finds himself in a normal universe like the one he just left. In fact, it may be precisely the one he left, but the black hole exit need not be near the entrance, and there is reason to think

FIGURE 7. A spacecraft might fall into a black hole and hope to emerge via the star gate into a universe like ours—maybe in fact ours. (See figure 3.) The dotted line is where infalling radiation can become destructively large and close this star gate, according to the General Theory of Relativity.


∞
A universe like ours
∞
Exit surface from black hole
Path of spaceship moving at less than the speed of light
Infinite and destructive tidal forces
Infinite and destructive tidal forces
Entry surface to black hole
∞
A universe like ours
Boundary where infalling radiation develops destructive infinite energy
∞
SPACE
TIME X SPEED OF LIGHT

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it would not be near that entrance.

We might at first worry whether the second universe is the same as ours. According to the theory, there is no reason it should not be, but equally no reason it should be either. (Parallel worlds!) If many charged or rotating black holes inhabited our universe, the possibility would exist that their exits would emerge in our own universe, or all in the same second universe, or in any number of alternate worlds (see Figure 8). More bizarrely, these various universes might be connected in such a way that, after traveling through several black holes, one returns to our own universe, but at a previous time. The theory does allow for this possibility, suggesting the use of black holes as time machines. In any case, the first pioneer to determine which of this possibilities exists, will be a very brave man, and exceedingly dedicated to the progress of science.

Unfortunately, at this point, hard science drags us back from such interesting speculation. The crucial flaw in the above discussion was the assumption that the spaceship had a negligible gravitational effect on the hole. Can a real spaceship travel through the hole without disturbing its structure? In short, the answer is no.

To see this, just consider the energy content of solid space garbage, laser photons, radio and other waves, all of which a well-equipped interstellar space traveller would likely spread around during his trip. The central problem is that some of this stuff falls into the black hole too. As it falls into the hole, garbage, for instance, has picked up a velocity very close to the speed of light. We know that mass increases to infinity at these velocities. By $E = mc^2$, this means that the energy of even the smallest amount of garbage has also become infinite. The same occurs with the energy content of infalling radio waves and light signals emitted by the ship; their energy goes up to infinity also. But what has infinite matter and energy densities in a black hole? The singularity, of course. Where the clean black hole provided clear sailing, by allowing for garbage or radio waves we have created a singularity of infinitely destructive tidal forces, as in the Schwarzschild case.

A moment's thought leads to the conclusion that the black hole star gate is a one-time affair at best. If just the radio signals transmitted by the space traveller can be so disruptive, the mass of the spaceship itself must certainly disrupt the black hole and close the gate behind him.

Assuming he makes it through in the first place. What if he is extremely careful not to sully the black hole before his journey? He maintains radio silence and stows his garbage bags. Could he make it through the tunnel?

Surely, his spaceship must have substantial mass. A mass falling toward a black hole is accelerating and, consequently, generates *gravitational waves*, analogous to the generation of electromagnetic waves by accelerating electric charges. These waves are oscillations in the gravitational field which travel at the speed of light. Again, this is in analogy to radio waves which travel at the speed of light and are oscillations in the electromagnetic field. Some of these waves travel ahead of the infalling

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spacecraft, are amplified to infinite energy in the same way as already discussed for radio waves; and the gate to the other side of the galaxy slams shut in his face. The star gate cannot even be used once.

The simple argument just given shows that the inner structure of black holes is unstable to small disturbances from the outside. Any amount of energy or debris falling in from the outside will develop an infinite energy density and destroy the inner structure of the hole. In a perfectly clean universe, we could not know *a priori* whether a given Kerr or Reissner-Nordstrom black hole contains a tunnel to another part of the universe. But we do know that, if we probe the black hole by trying to reflect radiation off it, we automatically destroy the star gate, because some absorption of radiation is inevitable. In the real universe, of course, the situation is even worse because radiation and matter are everywhere present to some degree and must be falling into any existing black holes.

So it seems, for instance, the collapsar transport system used in Joe Haldeman's *Forever War* will not work; nor does the physics at the end of the Disney film hold water (not to mention the metaphysics); and, in fact, the syphoning of extra matter from another universe mentioned at the conclusion of T.R.'s own novel will not go through either. At least these works were released as science fiction. Books such as Adrian Berry's *The Iron Sun*, which purport to be science are either flagrant rip-offs or bad science fiction. As either rip-offs or science fiction, they deserve no further serious consideration.

BIG SURPRISES COME IN SMALL PACKAGES: PRIMORDIAL BLACK HOLES.

Until now, we have concentrated our attention on large black holes, from 10 solar masses to over 10^{10} solar masses. In this section, we turn our attention to the other end of the spectrum: mini black holes. At the very beginning of the universe, at times much less than one second after the Big Bang, the density of matter was comparable to what is found in typical black holes. It is conceivable, then—but by no means proven—that a slight fluctuation in density would "snap" the matter into black holes. Such "primordial" black holes would range in size from the very large, about 100,000 solar masses, to the very small, about 10^{-5} grams. The small holes would be formed first, when the density was highest, followed by succesively large holes, until the density was too low to form any at all.

Large primordial black holes would behave in exactly the same way as the other large holes which we have already discussed. There is nothing to be added here. At the other extreme, holes of 10^{15} grams and below are remarkable objects. The density of 10^{15} gram black holes is so high that one cubic centimeter of them would contain the known mass of the universe! Holes smaller than this mass would exhibit extraordinary quantum properties, specifically the famous Hawking radiation named after its discoverer. Space does not permit us to discuss these amazing properties. Suffice to say, there is no observational evidence to indicate that holes smaller than 10^{15} grams exist or existed. Moreover, theoretical upper limits placed on

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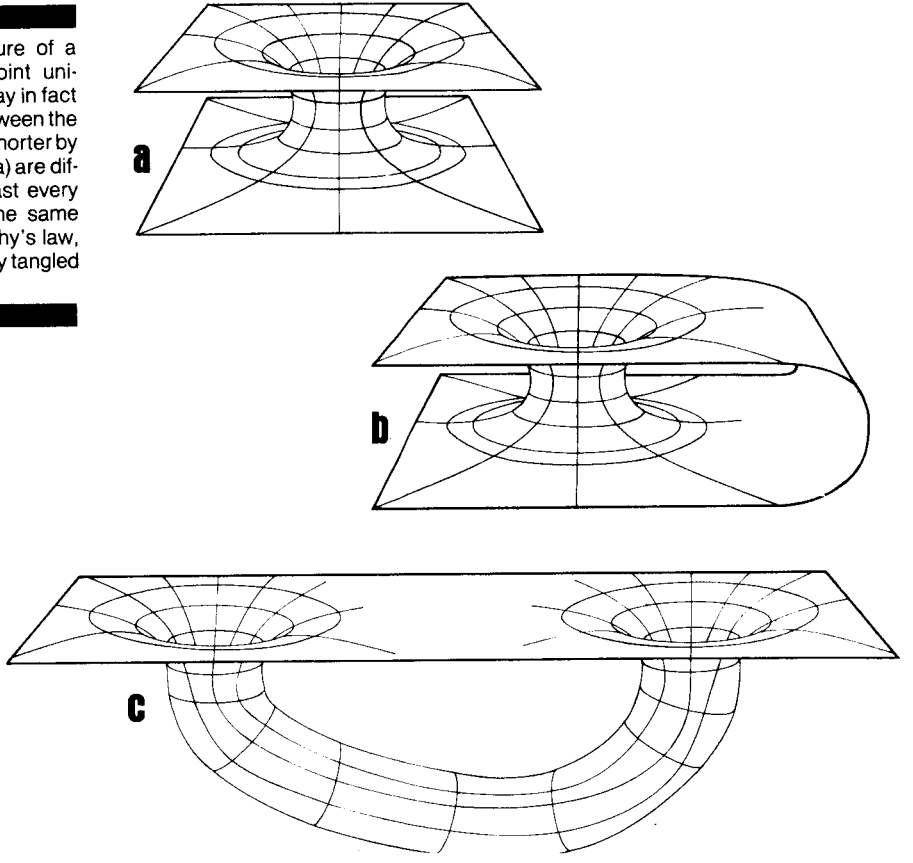

FIGURE 8. (a) A schematic picture of a black hole connecting two disjoint universes; b), c) The two universes may in fact be the same; then the distance between the entrance and exit *might* be much shorter by the hole. d) If the two universes in a) are different, we would hope that at least every connection would be between the same two universes. Appealing to Murphy's law, 3) is much more likely: a completely tangled web of interconnections.

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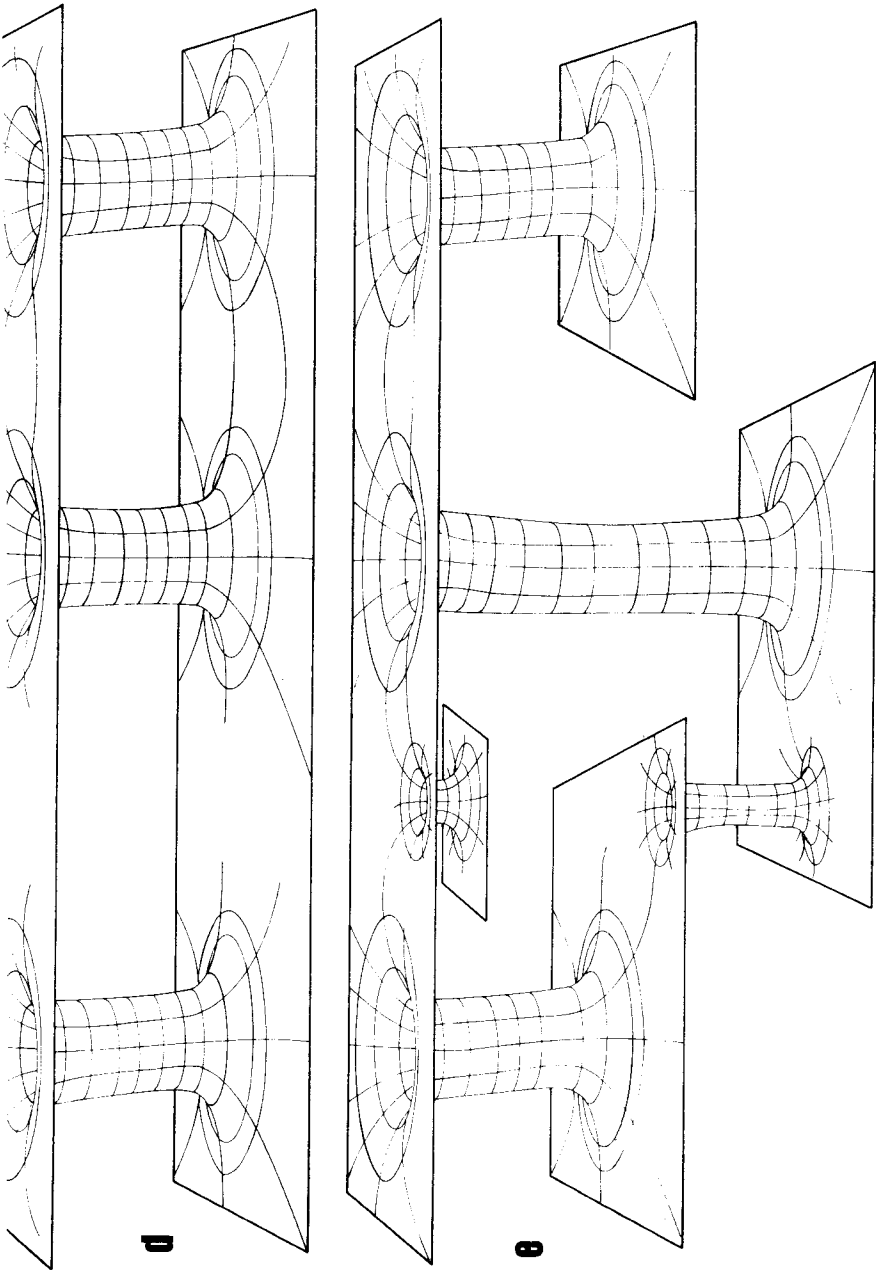

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such holes by Page, Hawking, Novikov *et al.*, and two of us (R.M. and T.R.), indicate that, if they ever existed, they were few and far between. For instance, there cannot now be more than about 10 black holes of 10^{15} grams per cubic parsec, each with the mass of a mountain but the size of a proton.

Primordial black holes with masses greater than 10^{15} grams have negligible quantum properties and can be treated classically. Such black holes have also received attention in science fiction and popular folklore and therefore their share of misrepresentation. Perhaps the most famous—or notorious—suggestion was put forth by Al Jackson and Mike Ryan, then at the University of Texas, that the 1908 Tunguska blast in Siberia was caused by the collision of a 10^{21} gram black hole with the Earth.

We may first ask, "What are the odds of such a collision taking place?" Not bloody likely. Assuming all the observable mass in the universe to be concentrated into 10^{21} gram black holes, one can calculate that one collision should occur about every ten ages of the Universe, or 10^{11} years. Marauding black holes do not seem an overwhelming threat to U.S. security. Nonetheless, it is possible that Tunguska was *the* collision. Although a 10^{21} gram black hole is small in radius, about 10^{-7} centimeters, its mass is large, about one million small mountains. Jackson and Ryan proposed that the gravitational attraction of this hole caused the surrounding air to be yanked inward, resulting in a compact ball of air whose shock effects produced the destruction seen in well-known photographs. There was, however, substantial debate on whether a black hole of this mass would have the claimed effect when interacting with the solid earth. Most physicists believe the ground shock would have been tremendous, much more so than what actually occurred. So in scientific circles the matter is considered dead and buried. In any case, Al Jackson and Mike Ryan have on occasion confided that the suggestion was not entirely serious in the first place.*

Detailed statements about the interaction of smaller black holes (about 10^{15} grams) with matter are difficult to make. Nonetheless, simple calculations give the following general picture, which should not be too far wrong: Recall, a 10^{15} gram black hole has the diameter of a proton. This is too small a size to rapidly accrete (gobble up) surrounding matter. Even if one considers that any nearby particle in random motion falls in when nearing the hole, one finds an accretion rate such that the black hole will not even double its mass in the lifetime of the universe. Talk of eating a planet becomes absurd. Thus, the black hole posited by Larry Niven in "The Hole Man" would certainly never gobble up Mars in less than extreme cosmological times, meaning millions or billions of ages of the universe.

WHERE DO WE GO FROM HERE?: PROSPECTS FOR THE FUTURE.

We have talked about many types of black holes and many properties but

*We have recently learned that a report in *Sotsialisticheskaya Industriya,* 1/24/80, indicates that ordinary meteoric debris was recently found at the Tunguska site.

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have omitted discussion of many other interesting properties as well. We have not spoken about Hawking radiation, nor about black hole collisions, nor about superradiance, nor about astrophysical accretion, nor about photon trajectories and imaging properties, nor about the influence of primordial black holes on nucleosynthesis after the Big Bang. We have also shied away from direct discussion of the famous singularity which occurs within all black holes. The singularity, as already mentioned, is the center of the black hole where all the matter has fallen. It is a place where the density of matter is infinite, as well as gravitational and tidal forces. When people speak of space and time ending at black holes, they are perhaps thinking of the singularity. But it may be a mistake to say space and time end at the singularity; what ends is our present knowledge of physics.

Much work is currently underway to remedy the situation. Many physicists believe that true singularities do not exist, that at such small distances the quantum properties of spacetime itself come into play. They suggest that matter cannot be compressed to a smaller size than the so-called Planck length, about 10^{-33} centimeters, where the quantum effects become dominant. According to this view, the singularities of classical black holes are nonexistent in reality and are only the temporary nuisances of defective mathematics.

At least two Russian physicists, Frolov and Vilkovisky, have recently claimed to have proven that black holes, in some sense, do not exist at all. Proper use of quantum field theory, they argue, shows that as matter collapses to form a black hole, it misses the singularity, "rebounds," and eventually re-expands beyond the event horizon. This process, for even Tunguska-sized black holes, will take longer than the age of the universe. Nonetheless, in a strictly logical sense, a black hole is no longer a black hole, but only temporarily out of sight. We are not yet sure whether Frolov and Vilkovisky are correct, but we are certain that the full merger of relativity and quantum theory will reveal many answers and even more questions. ■

ABOUT THE AUTHORS

Richard Matzner is Associate Professor in the Center for Relativity at the University of Texas. His interests are mainly in the theoretical properties of black holes, but in 1973 he was a member of an expedition to Mauritania to observe the total eclipse of the sun. Since then, he has continued work in observational relativity.

Tsvi Piran holds a Ph.D. from the Hebrew University of Jerusalem (1976), where his dissertation concerned "Astrophysical Processes Near Black Holes." He has since done research work at Oxford and the Relativity Center at Texas. He is now at the Institute for Advanced Study in Princeton. In addition to being a physicist he is a radioamateur.

Tony Rothman is Richard Matzner's graduate student at the Center for Relativity. His dissertation research concerns primordial black holes. He is also author of the science fiction novel, *The World Is Round*, a play, and several shorter works. He speaks Russian and plays the oboe.

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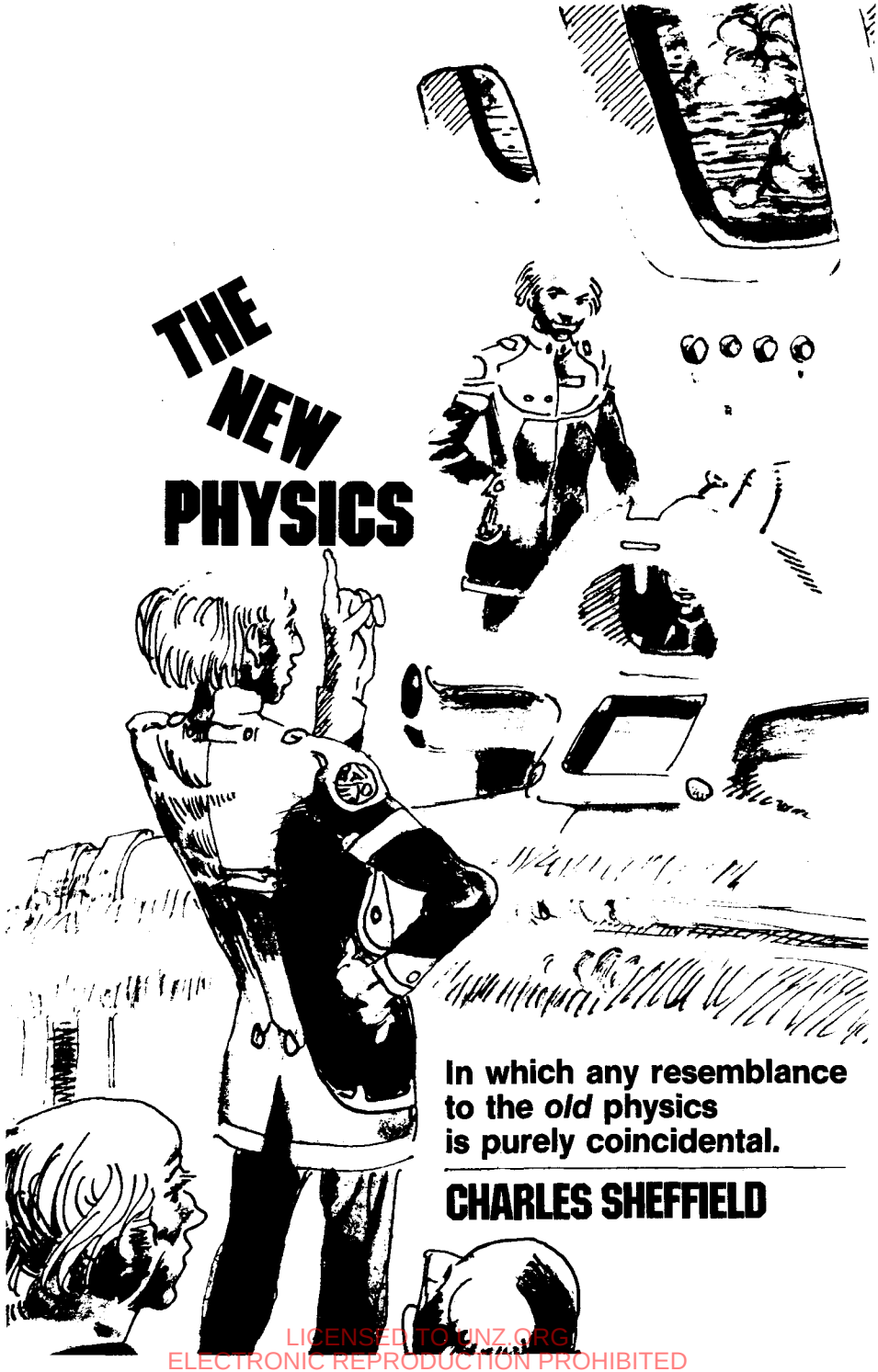

In which any resemblance to the *old* physics is purely coincidental.

CHARLES SHEFFIELD

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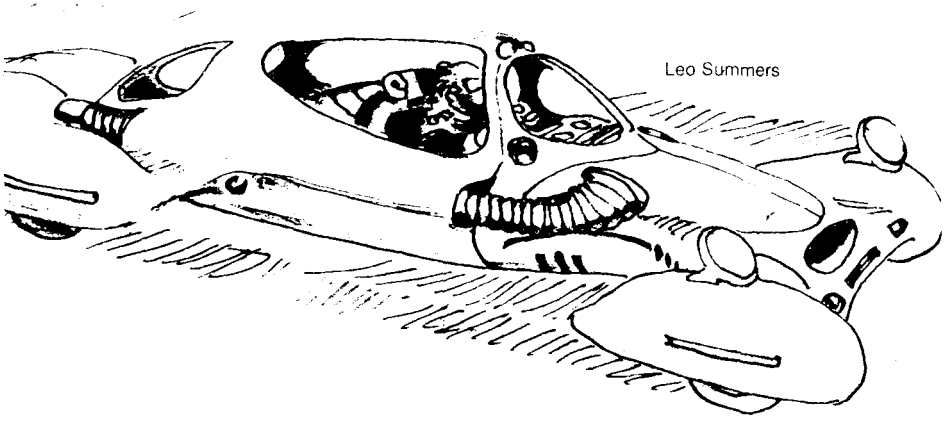
Listwolme is a small world with a thin but permanently cloudy atmosphere. The inhabitants have never seen the stars, nor become aware of anything beyond their own planet. There is one main center of civilization which confined itself to a small region of the surface until about a hundred years ago, when an industrial revolution took place. For the first time, rapid transportation over substantial areas of the planet became possible.

Orbital velocity at the surface of Listwolme is less than two kilometers a second. The meetings of the Listwolme Scientific Academy following the development of high-velocity surface vehicles are chronicled below. The highlights of those meetings were undoubtedly the famous exchanges between Professor Nessitor and Professor Spottipon.

The first debate: In which Professor Nessitor reveals the curious results of his experiments with high-speed vehicles, and proposes a daring hypothesis.

Nessitor: As Members of the Academy will recall, a few months ago I began to install sensitive measuring devices aboard the *Tristee Two,* the first vehicle to move at a speed more than ten times that of a running *schmitzpoof.* The work was not easy, because it was first necessary to suppress all vibration induced by the car's contact with the surface.

One month ago we achieved the right combination of smooth suspension and vibration damping. It was with some excitement that I placed one of our instruments, a sensitive spring balance, within the vehicle and we began steadily to increase our speed. As you may have heard, there have been reports of "feeling light" from the drivers of these cars when they go at maximum velocity.



Leo Summers

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Fellow scientists, those feelings are no illusion! Our instruments showed a definite decrease in load on the balance as our speed was increased. There is a relationship between *weight* and *motion*!

(As Nessitor paused, there was a murmur of surprise and incredulity around the great hall. Professor Spottipon rose to his feet.)

Spottipon: Professor Nessitor, your reputation is beyond question. What would arouse skepticism from another in your case is treated with great respect. But your statement is so amazing that we would like to hear more of these experiments. For example, I have heard of this "lightening" effect at high speeds, but seen no quantitative results. Were your balances sensitive enough to measure some relation between the lightness and the speed?

Nessitor (triumphantly): With great precision. We measured the weight shown on the balance at a wide variety of speeds, and from this I have been able to deduce a precise formula between the measured weight, the original weight when the vehicle was at rest, and the speed of movement. It is as follows.

(Here Professor Nessitor went to the central display screen and sketched on it the controversial formula. It is believed that this was the first time it had ever appeared to public view.

In the form that Nessitor used, it reads:

(Weight at speed v) =

(Rest weight) x $(1 - v^2/c^2)$

When the formula was exhibited there was a silence, while the others examined its implications.)

Spottipon (thoughtfully): I think I can follow the significance of most of this. But what is the constant, c, that appears in your equation?

Nessitor: It is a velocity, a new constant of nature. Since it measures the degree to which an object is lightened when it moves with velocity v, I suggest that the basic constant, c, should be termed the "speed of lightness."

Spottipon (incredulously): You assert that this holds anywhere on Listwolme? That your formula does not depend on the *position* where the experiment is conducted?

Nessitor: That is indeed my contention. In a series of experiments at many places on the surface, the same result was obtained everywhere, with the same velocity, "c." It is almost four times as fast as our fastest car.

(There was a long pause, during which Professor Spottipon was seen to be scribbling rapidly on a scribe pad. When he had finished his face bore a look of profound inspiration.)

Spottipon: Professor Nessitor, the formula you have written has some strange implications. You assert that there is a lightening of weight with speed across the surface. This we might accept, but you have not taken your formula to its logical limit. Do you realize that there must be a speed when the weight *vanishes?* When $v = c$, you have a situation where an object does not push at all on the balance! Worse than that, if v *exceeds* your "speed of lightness" you would calculate a *negative* weight. If that were true, a car moving at such a speed would fly completely off the surface. You would have created the

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long-discussed and arguably impossible "flying machine."

Nessitor (calmly): As Professor Spottipon has observed with his usual profound insight, the speed of lightness is a most fundamental constant. My interpretation is as follows: since it is clearly ridiculous that an object should have negative weight, the formula is trying to tell us something very deep. It is pointing out that *there is no way that an object can ever exceed the speed of lightness*. The speed that we can deduce from these experiments, *c*, represents the ultimate limit of speed that can ever be attained.

(Sensation. The assembled scientists began to talk among themselves, some frankly disbelieving, others pulling forth their scribe pads and writing their own calculations. At last a loud voice was heard above the general hubbub.)

Voice: Professor Nessitor! Do you have any name for this new theory of yours?

Nessitor (shouting to be heard): I do. Since the effects depend only on the motion *relative* to the ground, I suggest the new results should be termed the PRINCIPLE OF RELATIVITY. I think that . . .

(Professor Nessitor's next comments were unfortunately lost in the general noise of the excited assembly.)

Six months passed before Professor Nessitor appeared again at a meeting of the Academy. In those months, there had been much speculation and heated argument, with calls for more experiments. It was to an expectant but still skeptical audience that the Professor made his second address.

Nessitor: Distinguished colleagues, last time that I was here there were calls for proof, for some fundamental basis for the formula I presented to you then. It was to answer those calls that I embarked, four months ago, on a new set of experiments with the *Tristee Two* vehicle. We had installed a new instrument on board our car. It measures distances very accurately, and permits the car's course to be controlled to an absolutely straight line. For it had occurred to me to ask the question, if velocity and weight are so closely linked, could it be that *distance* itself depends on some unknown factors?

Spottipon (somewhat irritably): With all due respect, Nessitor, I have no idea what you mean by such a statement. Distance is distance, no matter how fast you traverse it. What could you hope to find? I hoped that you would have repeated the experiments on speed on weight.

Nessitor: My esteemed colleague, please have patience. Permit me to tell you what happened. We set the *Tristee Two* to travel a long distance at various speeds. And indeed, we confirmed the speed-weight relation. At the same time, we were measuring the distance traveled. But in performing this experiment we were moving longer linear distances over the surface of Listwolme than any other scientific group had ever done.

I therefore decided to conduct an experiment. We traveled a long distance in a certain direction, accurafely measuring this with our new instrument. Then we made a half-turn and proceeded far along this new line, again measuring distance all the way. Finally,

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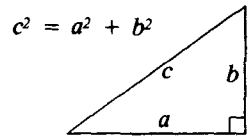
we headed straight back to our original starting point, following the hypotenuse of the triangle and measuring this distance also.

Now, we are all familiar with the Sharog-Paty Theorem that relates the lengths of the sides of a right-angled triangle.

(Nessitor went to the central display panel and scribed the famous Sharog-Paty relation:



There was a mutter of comments from behind him.)

Impatient voice from the audience: Why are you wasting our time with such trivia? This relation is known to every unfledged child!

Nessitor: Exactly. But it is not what we found from our measurements! On long trips—and we made many such—*the Sharog-Paty relation does not hold.* The further we went in our movements, the worse the fit between theory and observation.

After some experiment, I was able to find a formula that expresses the true relation between the distances *a,b*, and *c*. It is as follows.

(Nessitor stepped again to the display panel and wrote the second of his famous relations, in the form: $\cos(c/R) = \cos(a/R) \times \cos(b/R)$.

There was more intense study and excited scribbling in the audience. Professor Spottipon alone did not seem to share in the general stir. His thin face had gone pale, and he seemed to be in the grip of some strong private emotion. At last he rose again to his feet.)

Spottipon: Professor, old friend and distinguished colleague. What is *"R"* in your equation?

Nessitor: It is a new fundamental constant, a distance that I calculate to be about three million paces.

Spottipon (haltingly): I have trouble saying these words, but they must be said. In some of my own work I have looked at the geometry of other surfaces than the plane. Professor Nessitor, the formula you have written there already occurs in the literature. It is the formula that governs the distance relations *for the surface of a sphere.* A sphere of radius *R.*

Nessitor: I know. I have made a deduction from this—

Spottipon: I beg you, do not say it!

Nessitor: I must, although I know its danger. I understand the teachings of our church, that we live on the Great Plain of the World, in God's glorious flatness. At the same time I cannot ignore the evidence of my experiments.

(The Great Hall had fallen completely silent. One of the recording scribes dropped a scribe pen in his excitement and received quick glares of censure. It was a few seconds before Nessitor felt able to continue. He stood there with his head bowed.)

Nessitor: Colleagues, I must say to you what Professor Spottipon with his great insight realized at once. The distance formula is identical with that for distances on a sphere. My experiments suggest that *space is curved.* We live not on a plane, but on the surface of an immense sphere.

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a calendar of upcoming events

log

3-6 SEPTEMBER
Conference on Cosmic Ray Astrophysics and Gamma-Ray Line Astronomy (American Physical Society) at Minneapolis, Minn. Info: American Physical Society, 335 East 45th Street, New York NY 10017.

12-14 SEPTEMBER
MosCon II (Idaho area SF conference) at Moscow TraveLodge, Moscow, Ida. Guests of Honor—George Barr and Jerry Sohl, Fan Guest of Honor—Frank Denton. Registration—$8 until 1 September, $10 thereafter and at the door. Info: MosCon II, P.O. Box 9141, Moscow ID 83843.

23-25 SEPTEMBER
CompCon 80 (IEEE Computer Society) at Capital Hilton Hotel, Washington, D.C. Info: Compcon 80 Fall, P.O. Box 639, Silver Spring MD 20901.

26-28 SEPTEMBER
INTERVENTION BETA (2nd Salt Lake City Wasatch Conference) at Ramada Inn, Salt Lake City, Utah. Guest of Honor—Marion Zimmer Bradley, Toastmaster—Orson Scott Card. Registration—$8 until 1 August, $10 thereafter, $12 at the door. Info: P.O. Box 151366, Salt Lake City UT 84115. 801-355-8976.

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29 AUGUST-1 SEPTEMBER
NOREASCON TWO (38th World Science Fiction Convention) at Sheraton-Boston Hotel and Hynes Civic Auditorium, Boston, Masstts. Guests of Honor—Kate Wilhelm and Damon Knight, Fan Guest of Honor—Bruce Pelz, Toastmaster—Bob Silverberg. Registration—$30, non-attending membership $8 at all times. Registration $45 at the door. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to vote for the Hugo awards and the John W. Campbell Award for Best New Writer. Info: Noreascon 2, P.O. Box 46, MIT Branch Post Office, Cambridge MA 02139.

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by Anthony Lewis

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(The tension crackled around the hall. The penalty for heresy (smothering in live toads) was known to all. At last Professor Spottipon moved to Nessitor's side and placed one hand on his shoulder.)

Spottipon: My old friend, you have been overworking. On behalf of all of us, I beg you to take a rest. This "curved space" fancy of yours is absurd—we would slide down the sides.

(The hall rang with relieved laughter.)

Spottipon: Even if our minds could grasp the concept of a curved space, the teachings of the Church must predominate. Go home, now, and rest until your mind is clearer.

(Professor Nessitor was helped from the stage by kind hands. He looked dazed).

For almost a year, the Academy met without Nessitor's presence. There were rumors of new theories, of work conducted at white heat in total seclusion. When news came that he would again attend a meeting, the community buzzed with speculation. Rumors of his heresy had spread. When he again stood before the assembly, representatives of the church were in the audience.

Professor Spottipon cast an anxious look at the churchmen as he made Nessitor's introduction.

Spottipon: Let me say how pleased we are, Professor Nessitor, to welcome you again to this company. I must add my personal pleasure that you have abandoned the novel but misguided ideas that you presented to us on earlier occasions. Welcome to the Academy!

Nessitor (rising to prolonged applause, he looked nervous but determined): Thank you. I am glad to be again before this group, an assembly that has been central to my whole working life. As Professor Spottipon says, I have offered you some new ideas over the past couple of years, ideas without fundamental supporting theory. I am now in a position to offer a new and far more basic approach: *Space is curved, and we live on the surface of a sphere!* I can now prove it.

Spottipon (motioning to other scientists on the stage): Quick, help me to get him out of here before it's too late.

Nessitor (speaking quickly): The curvature of space is real, and the speed of lightness is real. But the two theories are not independent! The fundamental constants c and R are related to a third one. You know that falling bodies move with a rate of change of speed, g, the "gravitational constant." I can now prove that there is an *exact* relation, that $c^2 = g \times R$. To prove this, consider the motion of a particle around the perimeter of a circle... circle...

(The audience was groaning in dismay. Before Nessitor could speak further, friends were removing him gently but firmly from the stage. But the representatives of the church were already moving forward.)

At his trial, two months later, Professor Nessitor recanted all his heretical views, admitting that the new theories of space and time were deluded and nonsensical. His provisional sentence of toad-smothering was

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commuted to a revocation of all leaping privileges. He has settled quietly to work at his home, where he is writing a book that will be published only after his death.

And there were those present at his trial who will tell you that as Nessitor stepped down from the trial box he whispered to himself—so softly that the words may have been imagined rather than heard—"But it *is* round." ■

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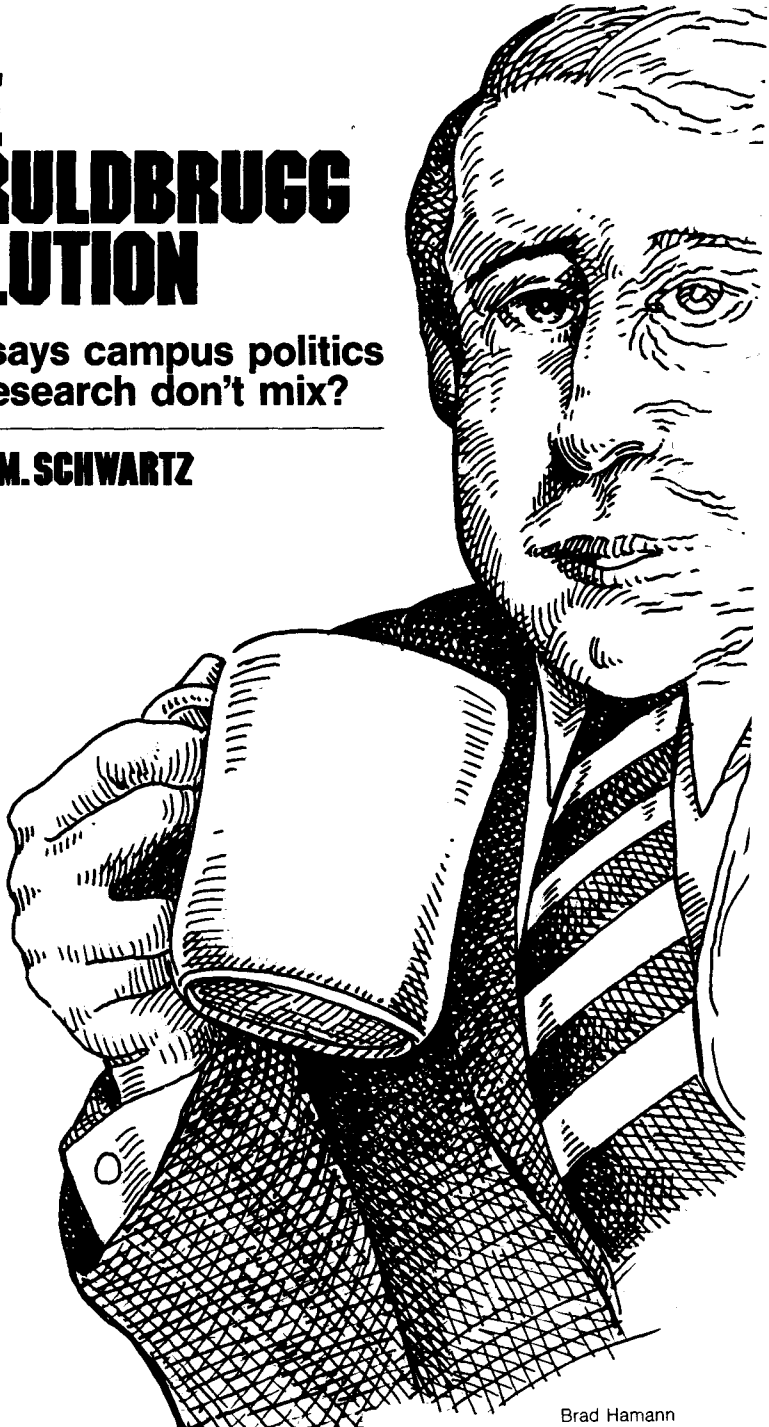
THE STRULDBRUGG SOLUTION

Who says campus politics and research don't mix?

SUSAN M. SCHWARTZ



Brad Hamann

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Dr. Fledermaus, chairman of the Remedial Communications Department at Struldbrugg State, shambled out of the conference room. He assured himself that no druggers had eluded the hall guards, then nodded.

Wider at the waist than at the shoulders, he knew—and enjoyed knowing—he held my future in his pudgy hands. If I didn't get tenure at Struldbrugg, the Redundancy Bureau would make sure I got Welfare Basic: tranks, sterilization, and assignment to whatever makework it could scrounge up for me. As I rose nervously to my feet, he smiled, sucking deprecatingly on a yellowed tooth before he assumed a mask of insincere sorrow.

"Uh, Ms. uhhh . . . Sherry, I regret to tell you . . ."

By the time my ears stopped ringing with shock, he'd rambled past the apologies to the explanations.

And I hadn't thought this could actually happen to me. Mike had been right all along.

"Of course," he continued, "you understand . . ."

All I understood was that if I didn't think of some solution fast, my days of living as an intelligent, thinking being—as much as that was possible at Struldbrugg State, where the guards and the trustees outnumbered the students—were numbered. The Redundancy Bureau gives you only six weeks to find employment before it steps in with its hypos.

To think, idiot that I was, that I'd rejected the offer of Mike from chemistry to share his scheme for making junior faculty secure by . . . what was that stuff? Acetone? That didn't sound right. All I remembered was calling him unprofessional, and now I didn't have a profession myself.

"Struldbrugg needs remedial English and . . . uhh . . . service courses like Stuhlwesen's new course on Sex and Relevance in the American Sitcom," Fledermaus rattled on. "Since you're actually an eighteenth-century specialist, some of us . . . ah . . . felt that perhaps you might have pedagogical reservations about teaching such . . ."

Damned right I did. When I mixed compazine and cheap Scotch (all I could afford on my pittance), I could survive teaching such drivel—just barely. But what I really loved—Swift and the eighteenth-century tradition— Struldbrugg State needed like it needed an enema. No, Struldbrugg State needed an enema.

I met Fledermaus's eyes, and the old bat bristled a little. "After all," he said, "Struldbrugg isn't Harvard, you know."

I could have told him that from the minute I laid eyes on the place. The town was so small that even the pumps at the one First National Gasohol were rusty and their guards were only nulls from the Redundancy Bureau.

But after five years in such a place, my contract renewed grudgingly because of loopholes that the union had bored for me, where could I go? Struldbrugg was supposed to have bought me time to finish my book on *Gulliver's Travels*, provided a steppingstone to one of the state-sponsored research appointments which were every scholar's only hope of regular meals. The steppingstone had twisted under my feet and the thing underneath it had stung me.

Maybe Mike would accept my apol-

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ogy. I'd do anything to keep from becoming one of the Welfare Basic nulls! Anything at all.

Fledermaus, however, flowed contentedly on. "Ah . . . you understand of course that every facility of the Department will be at your service. Umm, of course you might be wiser—let's simply say that the Provost indicated that he would prefer that members on terminal contracts not use the message services. But the stenobot—feel free, within reason, of course, to use it. Perhaps you might choose off hours or weekends to draft query letters after the next Job Service printouts are issued."

"Thank you," I said. Last season the Job Service issued its report six months late; if I followed Fledermaus's advice, I'd be a grinning null. Fledermaus glanced somewhat sharply at me, as if expecting me to call him "sir." Damn me for a bigger coward than I already was if I "sirred" him one more time. All "sirring" Dr. F. had ever got me was a terminal contract!

Maybe if I told Mike I'd changed my mind simply because I wanted to keep it

"I would, however, be remiss in my obligations," said Fledermaus, tongue insinuating itself around his teeth, "if I indicated that I consider you a viable job candidate before you actually finish your book. Of course, I mean no value judgment, heh heh heh . . ."

Heh heh heh yourself . . .

" . . . but I suspect you've been neglecting—surely just a *leetle* bit—your scholarly commitment in favor of, uh, teaching excellence."

Twenty-four hours a week teaching load. Office hours. Guard duty, and interminable faculty meetings: I suppose you could call that neglecting research. At least that's what the tenured faculty did. Much as I hated them, hated their plans to eke out a bleak future eating cat food on their pensions by teaching till they dropped of doddering old age (long after their critical faculties had rotted). Now, I envied them too. What little brains they had, they got to keep.

Fledermaus nodded benevolently. "Let me make so bold as to offer you this suggestion. Perhaps if you dropped to part-time for the rest of this year with—of course—an appropriate prorating of your ummm salary, you might be able to finish your book. Of course—"

The sudden rush of fear, hope, and abject gratitude I felt made me hate myself. *Wasn't this just what Mike predicted? "Sherry, you'll be kissing boots for a moldy bone!" He'd been right, damn him. Damn me worse for not listening to him in the first place.*

"Of course some of the Department might have a few reservations, but naturally I will speak for your candidacy."

"Thank you," I intoned dutifully. "I appreciate very much the offer of the possibility of a part-time position." This afternoon I would draft a memo of understanding to send Fledermaus (with a copy to the union reps in case Fledermaus tried to wriggle out of his commitment).

Part-time status meant full-time work at part-time pay. Just as Mike had predicted, Struldbrugg had pulled its usual trick and got something for nothing. Me. But what other choice did I have?

Maybe I'd only called Mike crazy and unprofessional, not criminal, for his plan to render Struldbrugg's senior fac-

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ulty unable to teach or lecture.

Tenure glinting in the balls of his eyes, Dr. Fledermaus beamed at me, moved by his own compassion. Clearly he thought he'd just won himself another grateful flunky; Struldbrugg was full of people who'd lost tenure, yet clung to shreds of employment in order to dodge Welfare Basic. It doesn't actually lobotomize you, but nulls really don't have much brain left.

Out of conclave hunched the rest of the Department. Their eyes fastened avidly on me and they smiled. Tongues flicked over thin, dry lips as they savored what they saw.

"No hard feelings then, I trust?" persisted Fledermaus.

If I showed any resentment, I'd blow my chance even for part-time teaching, so I kept my face blank while forcing my mouth into a rictus that approximated a smile. Nossuh, Boss! No hard feelings! The Department's faces eased.

Hail! We who are about to starve salute you!

A sick panic hazed my eyes, and my stomach cramped as if I'd eaten rotten soy, but I tried to keep my expression calm, to deny the department the sight of my pain. I wanted to turn on them, rend them—physically *and* mentally.

That would bring Bu Psych down on my head, and psychological reintegration was even worse than Welfare Basic.

I half-bowed, half-cringed, and walked away down the hall, remembering the future I once dreamed of—an office with genuine wood panelling, Persian rugs like my dissertation advisor had owned, gleaming sherry decanters . . . "Dream again and better," Twain had said in *The Mysterious Stranger*. Mork, I wish I could.

The last time I'd taught that story—which was the last time Struldbrugg had offered Am. Lit. (some burnout had read the abbreviation and thought he was taking Shakespeare in Translation) the most sensitive response I'd got out of the students had been "it gives ya a deepdown feeling." On a paper, for Mork's sake. Don't even ask about the class evaluations. The Provost, a grayback newly recruited from industry, had axed the course. Not cost-effective.

Dream again and better. Did nulls dream in their drugged euphoria?

"Sherry?"

"Yah?" I snarled. "Don' wan' 'ny. Need m'own space." I wasn't on duty for another hour yet. I began to tell that to whatever burnout was summoning me, but found facing me instead another junior colleague. Thank Mork! It was Mike of the test tubes and decrepit Bunsen burners.

"Come to see the victim?" I asked.

"So now you know," he said. "Come on. We can talk privately in my office."

Down the corridor we slouched, too disgusted to watch for druggers. What did junior faculty have worth stealing anyhow? On each side the walls were pitted and stripped. Clean rectangles showed where the new Provost had sold off the Baskin holos to pay the accumulated energy bills.

"What did they tell you?" Mike asked sympathetically.

"Fledermaus is nattering about part-time so I can peddle my manuscript on streetcorners. *I* call that Kwashiorkor city, but I suppose it's better than Re-

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dundancy's brain drain."

"You know," began Mike, switching into lecture mode, "with the retirement age extended to seventy-five—"

"Can't have all those ancient full profs leeching off Social Security, can we? Inflation might hit thirty-five percent or something."

"As I told you before, if you look at our situation objectively, there's only one solution. Our problem: there are simply too many tenured professors. They're locked in, so we're locked out. Solution: get rid of the professors."

"What's it to you?" I asked. "After all, the government needs scientists."

"To develop an aphrodisiac bubble gum to keep the nulls happy? Not me, Sherry. At least Struldbrugg provides me with a laboratory and doesn't ask too many questions about what I'm working on. But if I'm not tenured, where's my escape from government work? So I want tenure too."

Mike's chairman passed. Mike bowed. Mork help him if his department ever found out that he traded home-brewed acid for good class evaluations.

"So whatever I have to do to get tenure, Sherry, I'll do. You were wrong to accuse me of a crime. It's too easy for Bu Psych to nab scientists on intent. If we started killing colleagues, we'd only get drugged into giggling oblivion, and some damned grad student would get hired—*and* tenured—in our places. So I'm not going to kill anyone. I only want to speed up catabolism, the order of nature, and secure my own future."

"How?" I asked. This talk of the balance of nature sounded like double talk to me, and double talk always makes me nervous. All he'd mentioned to me before was "pressure tactics," and I'd jibbed at even so mild a term. I'd been so sure that my colleagues would judge me on my merits. That was a mistake I'd never make again.

"Let's look analytically at tenure, Sherry. What makes Struldbrugg dismiss a tenured faculty member?"

"A murder rap. Getting caught raping students more than once. Really egregious senility." I ticked off the charges on my fingers. "But Mike, our elders—and alleged betters—haven't the guts to murder. And as far as rape goes, I doubt they have the appropriate equipment for that either. And they're senile already."

"That's it, Sherry, senility!" Mike's eyes lit in his pallid face, and I thought he looked like Gollum. He fished in his pocket for keys, unlocked his lab, and we entered. The greenboard was scrawled with benzene rings and diagrams with tasteful hydrocarbons like botulism, curare, muscarine, and atropine.

"I thought you said you weren't going to hurt people!"

"Relax, Sherry." Mike read my face and laughed. "I'm not going to introduce botulism into the beer supply." He walked over to his desk and reached for some candy, offering me the box. Ordinary sugar cubes. I shook my head. On an assistant professor's salary, you learn to avoid things that make for expensive dental visits.

"It sure looks like it," I told him, and watched his face color. So he had a nasty temper, did he? I'd have to be careful not to antagonize him. "If you're not planning to poison people, why are all those diagrams up there?"

"They have something else in com-

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mon. They paralyze because they destroy a substance, an enzyme, called acetylcholine."

I knew it had sounded like acetone.

"Sherry, did you learn anything besides literature in grad school?" Mike asked. He sucked idly on still another lump of sugar. "Acetylcholine is what powers nerve impulses through the synapses. We know that it causes movement in muscle tissue. What I've been working on is proving that it also powers nerve impulses in the brain."

All I needed was a lecture. "How does this affect us?"

"Without acetylcholine, the neurons can't pass on nerve impulses, and the victim can't move. That's how curare poisons people. Remove acetylcholine gradually from the body and you simulate a condition like myasthenia gravis. Actually, however, you don't remove the acetylcholine. You nullify it with an antagonist called acetylcholinesterase. I've not only isolated how it's produced, but I've also synthesized some."

"That still sounds as if you're introducing a chemical into the body. A poison chemical."

"Sherry, there *are* poisons in the body already. And acetylcholinesterase is a substance our bodies create naturally. All I'm doing is altering the balance away from acetylcholine production and toward acetylcholinesterase."

"If you slow the faculty down further, they'll just take more naps. Or maybe, out of pure spite, produce more acetylcholine-whatever."

"You can't produce it out of pure spite! Really, Sherry, what you don't know about . . . well, never mind. What you've got to understand is that the neural receptors can only take in so much. I've synthesized an acetylcholinesterase so powerful that it not only neutralizes all the acetylcholine present in the body but causes the neural receptors to continue to nullify it."

Some of this was finally sounding familiar. "I read," I told Mike, "oh yes, occasionally I do read something besides critics or student essays, about a disease called Alzheimer's disease. The fax sheets—"

"How can you read that garbage?"

"How can you chomp *that* garbage?" I gestured at the sugar. "You were ticking me off because I'm not a scientist. If I don't read fax, how am I going to learn anything about science at all? The article I read said that lack of acetylcholine produced early senility—over a period of about ten years.

"My solution induces a condition very similar to Alzheimer's."

"Mike, neither of us have ten years to wait!"

"Settle down!" He opened a cabinet and brought out vials of two revoltingly-colored ichors.

"That's your acetylcholinesterase?" I put out my hand to touch one vial.

"Don't!" he cried, slapping my hand away. "If you spill it, you could absorb it through your skin. That's the enzyme itself. This other one is a solution that stimulates the production of the strength of acetylcholinesterase we need. Safer for the person administering it to carry about, since it needs to be digested to take effect. Unlike the enzyme, which has to be injected or can be absorbed through skin contact."

Such insignificant-looking things. I stared at the vials as if they held my

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future in them. In fact, they did.

"Both solutions also contain a powerful dose of hormones, mostly thyroids. This is why we don't have to worry about time, Sherry. While the acetylcholinesterase is nullifying enzyme production in the neurons, the thyroids simulate another condition —Cockayne's syndrome. Now that's a tragic thing. If you're born with Cockayne's, you have a life span of maybe six years before you die. Of old age. My solution merely mimics Cockayne's syndrome. As I told you, I'm not interested in the taking of life."

"If we gave this stuff to the faculty," I said slowly, "they'd be doddering in . . . how long?"

"At the longest, a couple of months. And we'd be safe."

He erased the greenboard and munched sugar while I struggled to believe him. It didn't take long.

"Why do you want me in on this?"

"You're my alibi. Who would possibly suspect a literary critic of destroying neural enzymes?"

The idea was so ludicrous we both giggled in chorus.

"So I'm your alibi. And I also have my office a lot nearer most of the faculty than you do. No one is surprised to see me in and out all day. You want me to administer it, don't you?"

If I were caught, all Mike had to do was deny knowledge of my actions. I'd simply be another psycho flinging chemicals about. That way lay psychological reintegration, but unemployment was no better.

"Sherry, are you with me?"

I nodded, and he grinned. Mork, he must be glad to be able to talk about his work, even to a non-scientist. He poured drinks (I winced at the label on the bottle), and we relaxed. I found myself laughing almost hysterically. I mean, I wasn't really seriously planning to do this, was I?

No, I wasn't. Not seriously. I'd laugh all the way to job security.

"What do you want me to do first?" I asked.

"Look," said Mike. "I'm production; you're distribution. I don't even want to know how you're going to administer it. I assume, though, that you'll choose to use the stimulant, rather than the enzyme itself, in order to diminish risk to yourself. I wouldn't trust you with the other stuff anyhow. Do it as you choose; do you think I'm Doc Sabin to go from school to school with my stuff?"

"You do enough with sugar," I said. "Maybe that's why so many burnouts around here have bad teeth."

Something in Mike's face made the cheap liquor roil in my stomach. If he could turn on his department, he could turn on me. I gulped the rest of my unpleasant drink and left, a supply of solution hidden in my briefcase.

"Do you want me to make the coffee?" I asked the Provost's secretary.

"Saint Sherry on the Silex," snickered the last surviving religion prof in the College. The news I'd been denied tenure and was sweating out a part-time appointment fight must have spread through the campus.

"At $25.00 a kilo, untenured people damned well better de-acquire the caffeine habit—or turn to tranks," someone else remarked. "They'll be on full

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tranks soon enough." I didn't turn from my careful measuring of coffee, chicory, and Mike's solution, but I recognized the speaker as a tenured reading specialist, secure in a skill Struldbrugg needed, and smug in her security. I smiled to myself: she drank seven cups of the Provost's coffee a day.

"*Bon appetit,*" I wished them all, and left.

Dr. Fledermaus had beamed when I contritely requested permission to observe him in class: he thought I was trying to ingratiate myself with him—with an eye, no doubt, to that part-time work. Actually, I wanted to monitor the progress of Mike's and my "experiment." You see, Fledermaus drank a *lot* of coffee.

His lecture on "Myth in the Classic Stan Lee Comic" progressed about as well as could be expected. Only three students snored. One girl stropped metal nails, two more gaped in the corners, tranked into bliss, their earphones flying them even higher. On and on and on droned Fledermaus. Suddenly he looked up, his eyes uncertain. He rubbed a dark spot in the center of his forehead.

"Now where are we?" he asked for the tenth time. "This isn't what I want to talk about. Comics! Bah, pablum for morons! You want real myth, you turn to William Shakespeare, but then all you children, you're all too young to remember reading Shakespeare. Time was, when *I* was a student, everyone had to study, memorize him. These days—how many of you even know your own National I.D. numbers?"

"Do you?" challenged a student from the back of the room.

Like a goaded fool, Fledermaus started to recite his—and stuttered over the last half. He'd forgotten it. And if he was digging up his days in school, he must be reverting to second childhood fast.

"But I remember *King Lear,*" he protested. "*Blow wind and crack your cheeks . . .*" Two students stuck their thumbs in cheeks already bulging with gum and produced loud popping sounds before they burst into the laughter of well-fed bull elephants.

"*Rage, blow . . .*" persisted the old man. So did his mimics, followed by the other students who had retained consciousness. Increasingly upset, Fledermaus tried to hush them. His hands shook as he raised them to adjust his glasses, and instead knocked them to the floor, revealing the large brown spot, like a liver splotch, centered on his forehead. He hadn't had that before I'd dosed his coffee with the Struldbrugg solution. I'd better check with Mike about that pigmentation.

"Whoosh!" the class chanted, imitating the wind. With a huff and a puff, they whooshed at Fledermaus, who gobbled incoherently and collapsed.

I felt an instant's pity for the body crumpled by the desk. *I am a very foolish, fond old man . . .* He'd have shut me out, starved me, watched me be drugged into a null. He was my enemy. I leapt to my feet and took charge of the class.

"Don't worry about side effects like the pigmentation you noticed," Mike told me in his lab an hour later. "If you're comfortable thinking of it as an analog to liver spots, don't let me stop you. We're on our way, Sherry; your

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distribution system's working great. Last week three full professors in my department were forcibly retired. Tenure, here I come!"

As younger colleagues collapsed babbling about Fledermaus, he lay comatose and then slowly began to recover. I heard stories of his latest squalid cravings for sweets (Mike sent him a box of sugar cubes anonymously) and trashy sitcoms, but I still worried.

"I think he's going to live forever," I mourned to my partner. We sat drinking in his lab one afternoon after classes. The bottle he kept in his desk was now of drinkable quality. "You know, they're still keeping him on staff. Maybe he'll actually return to classes."

"Dr. F. has had it," Mike stated. He reached for some sugar, and leaned back contentedly. Only yesterday his department had voted him tenure—after an unprecedentedly-short probation period of ten years. Now he sported recently-rumpled polytweeds and a confidence, almost an arrogance, new to him.

"Sherry, I told you not to worry about it. You'll *be* tenured."

I suppose I was glad.

"But you're right about one thing: Fledermaus is not going to die. None of the people you slipped that solution to is ever going to die. Apparently the hormones I mixed the acetylcholinesterase stimulant with have produced an even more drastic side effect than those blotches you noticed. The hormones do produce a condition that mimics Cockayne's syndrome in all but one way: my serum induces senility, all right, but it also acts like—well, what would your pet writers call it? The fountain of youth? Immortality." He licked the word off his lips with some more sugar. "In a way, you might say we're doing them a favor."

His eyes glinted with self-satisfaction. My Mork, tenured only one day and already so smug? The vials of solution gleamed as if fire shone in their depths.

"Struldbruggs," I whispered. "In *Gulliver's Travels* the Struldbruggs were immortals, but their minds died and they—you've made Struldbruggs of them all. That's living damnation."

Mike's narrow chest puffed with righteous indignation. "Just you remember, my girl, who doped their coffee. All I did was pursue my line of research, which has now been recognized and rewarded—justly—with tenure. Unlike the incomplete research of some people whom I won't name. So if you're going to get huffy, just don't you forget—"

Now that Mike had tenure, he'd want to be rid of me. I'd been his accomplice, the only person on campus who knew precisely what his research led to. And no one knew better than I that if he chose to get me, I'd be got. Unless I got him first. And didn't I have a right to protect myself? *Think fast, Sherry, or you'll be drooling in a matter of weeks.*

First, I thought, I'd flatter him. Most academic males are highly susceptible to flattery—probably since they get so little of it from women.

"Really," I began, "I'm not making value judgments. I do appreciate the level of research you've accomplished. In fact, I'd like to understand still more of it, despite the tech-phobia all us Eng-

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lish specialists have. Isn't actually making—I mean synthesizing—the solution ferociously complex?"

Mike preened. "Initially, it was extremely difficult to synthesize the acetylcholinesterase in sufficient quantities to isolate its stimulants but now I've refined the process to such a point that—Sherry, even you could do it."

"Really?" Somehow I managed a tone of awe-struck admiration without gagging.

"I'll show you." Academic vanity would undo him yet. I might be a threat to him, but I was still the only person in the world to whom he could boast. Step by step he demonstrated the procedure. I fumbled to convince him further of what he already believed—the incompetence of all humanists in a laboratory. But I could learn, and one thing Struldbrugg State had taught me was how to follow orders. I'd have no problem at all—except the one I was about to eliminate.

I refused Mike's help in cleaning up.

"What about a drink?" I asked. "You wash your hands; as soon as I'm done here, I'll pour. After all—" I forced a laugh "—you're the tenured one of this team."

"I'll pour," he said, and I knew I hadn't really fooled him at all. He'd just wanted someone to show off to. Having had the satisfaction of explaining—of teaching—his method to someone reasonably intelligent, he'd insure now that I could never give him away by drugging me into a squalid imortality.

Mike came in with two plastics and a bland expression on his face. For a minute I considered running, but I knew that if I fled now, nothing I ate or drank would be safe again. I'd never get another chance to be so close to Mike again. So I reached for one of the cups, lifted it as if to toast Mike, moved toward him, and stumbled.

My drink splashed him from face to necktie.

What's the first thing you do when something hits you in the face? You lick your lips!

Mike licked his lips, then froze. Digestion would make the acetylcholinesterase harmless in his system, but nevertheless he ran for the sink to rinse his mouth out. He had left his own drink unguarded. I protected my hand with a towel, opened the flask of acetylcholinesterase again, and spilled it on the plastic. For good measure, I also sprinkled some on the sugar cubes he always munched. Then I left.

Though I wanted to run as far as I could from that lab, I forced myself to linger outside the door, watching through the tiny window as he picked up his drink. He looked at it, then hurled the plastic against the wall. As if that single act dissipated much of his rage, he sat down again, absently wiping his hand, then reached for his supply of candy.

Hadn't Mike said he didn't trust me with the acetylcholinesterase solution? What a shame I could never tell him how right he'd been!

"I've reversed your department's negative tenure recommendation," said the Provost, eyeing me to make sure I looked appropriately grateful. "In fact, the trustees have indicated that it is their will I inform you that your candidacy—especially in light of the large number of illnesses we've had

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lately in the ranks of the senior faculty—is greatly welcomed. They have empowered me to offer you, moreover, the position of Acting Chair until such time as you can be confirmed. Of course, I am now prepared to negotiate a raise and discuss a reduction in teaching load; I am certain you will be eager to recommence your scholarly work."

Recommence! And all these years, I'd thought that the Provost had had some illusion that one could teach and still do research. So I owed him. Too bad he was a tea drinker, or I'd have already paid him.

I noticed that his last vacation—a cruise all those graybacks took cruises—had left him with a very fine tan. And he sat at a most attractive teak desk. A cruise—time to plan—and a desk like that would do very nicely for me. In fact, I had a fancy for *his* desk.

I leaned forward, steepling my fingers, and began to dicker. The Provost sipped his tea, laid the steaming cup down. No committee work. Six hours of upper-level teaching a term—four if I accepted department headship.

After a while he leaned back in his chair, respect in his eyes.

"I didn't know any of you in English were so hard-boiled," he said. "Really, you're wast—" he caught himself, sipped at his tea to cover the moment. "I'll just call the President. He wanted to know your decision."

The instant he turned around, I grabbed his cup. He liked his tea strong, so I tripled the dose of Struldbrugg solution. He finished his call, gulped the rest of his tea, and smiled.

"I should have offered you a drink. Would you like one? I've some brandy that's good for celebrations."

"I don't drink during working hours," I told him.

"Good girl," he approved. "With an attitude like that, I can see you have a fine future ahead of you."

When the Provost collapsed last week, I took over his office. I leaned back in his tufted leather chair and thumbed open the messenger's computer circuits.

"I want a printout of all executives," I instructed it. "Make that junior executives, no more than, say, thirty-five years old—in the Fortune Five Thousand Index. To each of them I want the following letter sent—on bond paper, not fax. Letterhead: upper left hand corner—a sort of fountain of youth motif. Below it, engraved letters saying "The Struldbrugg Foundation." Letter follows:

" 'Dear (insert the name of each person on the printout): Are you interested in rapid advancement in the corporate chain of command despite a senior management that wants to die in harness? Let me share with you the results of my years of painstaking research . . .'"

Damned right I had a fine future ahead of me! ■

● Religion will not regain its old power until it can face change in the same spirit as does science. Its principles may be eternal, but the expression of those principles requires continual development.

ALFRED NORTH WHITEHEAD

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JOHN W. CAMPBELL
ANOTHER REMEMBRANCE
BARRY N. MALZBERG

Campbell. When I was reading the stuff in the fifties he *was* science fiction; an autocratic figure synonymous with the field and as inaccessible to a 13-year-old Brooklynite as—well, as Heinlein, as Asimov. Much later in the sixties when I started to write it he had become the living symbol of everything that I felt the field had to overcome, that *I* had to overcome to make a contribution to the field. In the seventies I won the first award given in his memory—*Beyond Apollo*, best science fiction novel of the year, John W. Campbell Memorial Award 1972—and I haven't recovered in time for the new decade. Cries of loathing, cries of pain. Brass Tacks in early '74 is full of them, you could look it up.

I have only one John W. Campbell story but I think it's a good one and cautiously, after more than a decade I'd like to enter it in the memorial sweepstakes. I met John in 1969, a month before the moon landing, for the only time, sat with him in his office for three hours under the gaze of Catherine Tarrant, argued many things. A young man's intensity is a terrible thing to bear (for no one more than the young man himself.) "You've got to understand the *human* element," the young man said, "it's *people* dealing with these machines, being victimized by them—"

"I'm not interested in failure, I'm interested in success. Man is a problem-solving animal," John said, gazing at me flatly. Much later it occurred to me that he must have been lonely. Many other things were going on, in and out of science fiction in the late sixties; the writers weren't coming up to the offices as much (they were spread out all over the country) and the newer ones were doing novels and writing for original anthologies. "Mainstream literature is about failure, science fiction about success. We're going to land on the Moon a month from now and science fiction made that possible."

Maybe it did. Probably it did. The young man's intensity however had turned to wrath; here was the living archetype of science fiction and he wasn't *reasonable*. We argued civilization. The democratic principle. Politics. The fall of the cities, the collapse of post-industrial democracy. John wouldn't give an inch. Neither would the young man. It became twelve thirty. "I'd better go," the young man said. This was, after all, John W. Campbell. It never occurred to me until much later that he might have wanted me to stay for lunch but in light of our intellectual disagreements didn't know how to ask. "It's an honor to have met you finally, sir," I said. I shook his hand. Nodded at Catherine Tarrant. Left the office and stood by the elevator bank at 420 Lexington Avenue, the old Conde Nast building.

The elevator was a long time coming. While I waited the full sense of the morning came over me, the schism, the gap, the irreparable distance, the sheer *unreason* of the man from whom, a decade and a half ago I had learned all that I needed to know about what would eventually become my life. I began to shake, with recrimination, with sadness, with regret. The *stubbornness* of the man—

The elevator did not come.

Around a sudden corner loomed the beaming figure of John W. Campbell, on his way either to or from (but how could an archetypal figure have simple human need?) the lavatory. He regarded me for a while as I suspired in his gaze, noting the shaking limbs, the reflexive shaking of the head, the sigh of acknowledgement and despair which passed from me—

A twinkle came into the Campbell eye. "Don't worry about it, son," he said judiciously. Kindly. "I just like to shake 'em up."

Then he went back to his office and the elevator came and I went back to my life.

I took John right serious.

I'm *still* trying to shake them up.

I miss him.

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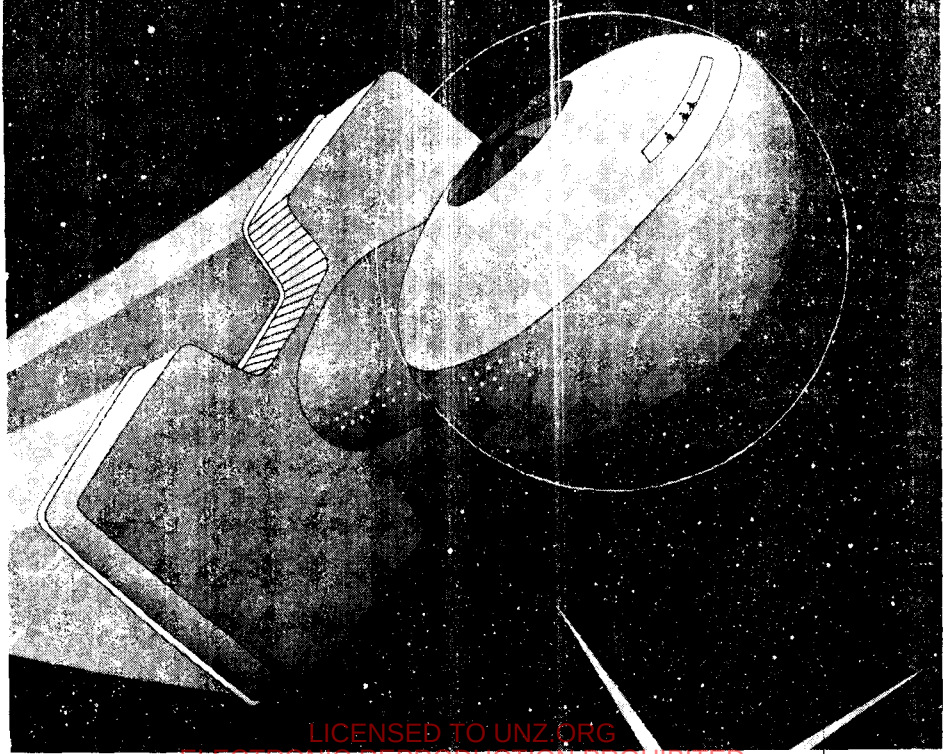
WHAT THE VINTNERS BUY

Human beings tend to look for The Solution to a problem. But sometimes there's more than one--and one is not enough.

MACK REYNOLDS



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And oft though wine has played the infidel,
And robbed me of my robes of honor, well,
I've wondered often what the vintners buy,
One half so precious as the stuff they sell.

Omar Khayyam

Upon his dismissal from the presence of Norman Victor, Stacy Temple had marched from the offices of His Leadership through the extensive further offices beyond, accompanied by a secretary in a Security major's uniform, the same one who had escorted him through the Security guards an hour earlier.

She was saying, "It is understood that you report only to His Leadership. Not even Security is aware of your mission. For the sake of prestige, you have been given temporary rank of Sergeant Colonel. Your allotment is unlimited. One question, Colonel Temple. Will your assignment be taking you overspace? If so, we will take the steps necessary to issue you unlimited units of United Planets basic."

Stacy Temple came to an abrupt halt and kept himself from staring at her. "What was that last?" he said.

"Will it be necessary to issue you an interplanetary credit rating I.D.? His Leadership failed to inform me on this detail."

"Yes," Stacy said crisply. "I am sure the assignment will take me overspace."

"Very good, Colonel. I took the initiative of having the credit I.D. made up, just in case. Here it is."

He looked at her. "You have more energy than is prevalent around here, Major. Aren't you as fond of nartha as our fellow citizens?"

She said stiffly, "I am allergic to nartha, Colonel."

"Well, good for you."

He really looked at the woman for the first time. Not woman, girl. She couldn't yet have reached thirty.

She wouldn't have been termed pretty. She was too handsome for that, too Junoesque. No, that wasn't it. She was more the Artemis type. Diana. Her face had a certain questioning quality, and he would have laid odds that the corners of her mouth quirked in amusement, making it irresistibly kissable. What in the name of Sacred Mother Earth was she doing as a Security major?

They resumed their march toward the portals of the New White House.

"My name is Raleigh, sir. Major Diana Raleigh. I am to act as your liaison officer. Simply call the White House and identify yourself. I will be summoned immediately. I am on twenty-four hour duty."

The newly created Sergeant Colonel was amused. Diana. Only moments ago he had been thinking of her in terms of the Roman goddess. He looked down at her, not having far to look.

"You have had a great deal laid on you, Major. Why not have three officers, on different shifts?"

She frowned slightly. "I wouldn't know, Colonel. Perhaps because of the high security nature of your assignment His Leadership wishes as few persons as possible to be aware of it."

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It came to Stacy Temple that Norman Victor had selected for this project two of the very few adults on the whole planet who were not users of the drug. He doubted that it was coincidence.

Some similar thought must have gone through the girl's head. She said, "Colonel, it occurs to me that you don't use nartha either." Then, catching herself, "Excuse me, sir. I wasn't prying."

He grinned at her, an expression that made his ordinarily craggy face drop ten years. He said, "At ease, Major." He added quizzically, "How did you know? Actually, I've never tried the stuff. I wasn't on Earth when the Ceutans first introduced it. By the time I returned, its use was universal."

They had come to a halt at the massive doorway, flanked by the ever-present Security guards.

She allowed discipline to slip to the point of a quick smile in return to his grin. "It's in the way you walk, sir. And in the way you talk. I haven't heard snap in a man's voice for years."

Her eye fell on one of the muffle-gun bearing sentries. He wasn't exactly slouched. Her voice bit out, "Attention there, you! Where do you think you are, on leave?"

The guard stiffened, his eyes straight ahead.

"Must have had a bolt just before coming on duty," she muttered.

Stacy Temple grinned at her again. "You seem to have a bit of snap in your own voice, Major . . . uh, Diana."

She let him know she was strictly business. "Any immediate instructions, Colonel Temple?" Her eyes were leveled on his.

He couldn't keep from saying, "This twenty-four-hour duty as my liaison officer. Suppose I called you about midnight and asked you to come to my apartment?"

She didn't as much as twist a facial muscle. "Then, sir, I'd come." She added, without change in inflection, "Properly armed, of course, in case the Colonel was in danger."

Stacy Temple was hard put to keep from throwing his head back and roaring with laughter. "No instructions as yet. I'll see you later . . . Diana."

"Very good, Colonel." She executed a perfect about-face and marched back toward the wing which housed the personal offices and quarters of Tyrant Norman Victor.

He looked after her for a moment, then turned to go down the score of steps to where a three-wheel would take him to the parking area. He had too many other things to think about to dwell on Major Diana Raleigh's admitted charms.

Such things as his now-perfect method of escape from the planet of Hamilton.

In his maddest dreams he couldn't have conceived of such an opportunity. Unlimited authority to go where he would, do what he might. But on top of that, an unlimited amount of United Planets basic, interplanetary currency, legal exchange on every world in the loosely-knit organization.

He had no doubt that it had not been Norman Victor's intention to have him leave Hamilton. One did not easily leave Hamilton. Usually, when one did, on business or diplomatic mission, there were forces working at home to insure return. One's family, for instance.

He had decided to take the step. He

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held only contempt for the planet of his birth. He had planned to obtain another assignment over-space and then to defect. It would have meant starting again at the very bottom, probably on some frontier planet.

But now! Perfect freedom to travel over-space and unlimited finances, until he made his play.

The scooter delivered him to the vicinity of his floater and he dismounted from it. It whirled and darted back to from whence it had come.

It was at that moment the trio jumped him.

They came fast around the corner of his own floater and made no preliminaries. Two grabbed at him, one jabbed at him with a hypo-gun.

Stacy was so completely startled that in trying to fall back he tripped over his own legs and stumbled to the right. Hands grasping for him—to hold him while the hypo-gun did its work in close—fumbled, slipped, collided.

He tried to recover his stance, but in the confused jumble, lost balance again and came to knees and hands. He heard the hypo-gun cough and one of his three assailants grunt. Had he had time, that would have brought a laugh.

He now came quickly to his feet, butting forward in full weight. There was another painful grunt. He felt a heavy blow on the right side of his head but managed to survive it.

There was a heavy-set figure ahead of him. He brought up both fists simultaneously in an improvised blow to be found in no treatise on hand combat. However, they landed immediately below the rib cage and lifted the recipient a good two inches into the air. He was unconscious before hitting the ground.

Stacy Temple whirled. The one with the hypo-gun was coming at him, the instrument advanced. Stacy kept moving. It was his only chance. He darted to one side, flicked out his hand chopper-wise, and banged the other's wrist. The hypo went spinning.

Stacy's eyes darted to locate the third but that worthy was sinking groundward, his eyes wide but glazed, a victim of the hypo-gun's miss.

There remained now but one assailant and he was unarmed. In fact, he had retreated, his back to the floater and obviously on the defense.

The other was without resistance. Stacy grabbed him roughly by the jacket and shook.

"Temple!" the other stuttered, trying to pull his once-intended victim's hands away. "Stacy Temple! Don't. You don't understand. We've got to get out of here. The guards!"

Stacy glowered at him, stopped shaking. "*We've* got to get out of here? Who's *we*? I'm about to yell for the guards. How'd you know my name?"

"Citizen Temple, please, please. I can explain everything. We've got to get out of here before the guards come."

The other was middle-aged. Too plump for a hoodlum. Stacy Temple held him with one hand, let his eyes go to the fallen two. There was something about them that didn't add up to gangsters. One of them began to groan.

"All right, talk," Stacy snarled at his captive, shaking him like a terrier a rat.

"You've got to come with us," the other got out, through rattling teeth. "This was all a mistake. We staged it so that later you would have an alibi,

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if it came out. It would look as though you had been . . . kidnapped.''

Stacy Temple said incredulously, ''You mean you're trying to talk me into going with you, now that your kidnapping attempt has failed?''

''Yes. Yes, please, Stacy Temple. You must.''

Stacy shook him again. ''You obviously think I'm a flat. What do you want? Why should I go with you?''

The other's eyes darted anxiously. His voice, already a whisper, went lower still. ''Because, Stacy Temple, you're a Jeffersonian.''

This, then, was the ultimate surprise the other had dealt him.

Stacy Temple took a double step to the side, scooped up the hypo-gun, then spun back. His voice was dangerously cold as he motioned with the device, ''Get into my floater.''

''Yes, yes, but the others.'' The smaller man was looking in dismay at his confederates, one of whom was staggering to his feet. ''If the security guards get them, everything will be extracted, including your politics.''

''All right,'' Stacy said bitterly. ''You there, help get this cloddy into the back seat.'' He made motions of command with the hypo-gun. Whatever the result of this mess, he knew it was going to interfere with his plans.

The two would-be assailants manhandled their drugged confederate into the rear seat, as commanded, then looked to Stacy for further orders.

Stacy said to the older one, ''You drive. I'll sit beside you. Get out of the lot. Then go slowly. I have to think.''

As soon as they had departed the immediate area of the New White House, Stacy said ominously, ''Right. Start making lots of sense. Where did you have in mind taking me when you jumped me back there?''

''To the Council of Seven.''

Stacy stiffened. ''Then there really is a Council of Seven?''

''Yes,'' the other told him.

Stacy said, ''I suppose you'll want to blindfold me or something, eh? Well, that's . . . ''

The other was shaking his head. ''No. It is not necessary, Stacy Temple. The Council has deep trust in you.''

There was evidently wealth and power behind the organization, Stacy realized, as their course took them to the Heights section of the city—to the swank residential area and then to one of the most elaborate mansions it boasted. It was, he realized, ideal guise for a revolutionary headquarters. One does not look for the rebel among that element in society which most highly profits by the status quo.

They floated up an elaborate drive, abandoned the vehicle at the entrance. Stacy Temple felt disquiet as the two goons drove it away, but he was committed now. He followed his guide up the bank of steps to the entry.

The other obviously knew his way well. He strode briskly down the grand hall beyond, turned to the left and passed several heavy wooden doors. There were servants of the second caste in livery and by their appearance Stacy Temple suspected that they doubled as guards. They seemed unusually young.

His would-be kidnapper, now guide, opened one set of doors, ushered him through a small reception room, and

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turned when they arrived at another set of doors.

He said simply, "They'll be waiting for you, Stacy Temple." He turned and left.

The Council of Seven. Stacy Temple hadn't really believed it existed. He turned the knob and opened.

His immediate reaction was, *Why, they're all old men.*

They sat, in what was obviously a library, around a heavy conference table, their eyes going to him as he passed through the door.

He said, "My name is Stacy Temple."

The one at the end of the table nodded. "We have been awaiting you, Citizen Temple."

Another said, "Please be seated."

Stacy selected one of the chairs about the table and sank into it, alert. Even at this late stage, he still couldn't be sure that it wasn't a Hamiltonian trap. While they sized him up, silently, he returned the favor.

None, he estimated, could be under seventy. But revolutions, he had thought, were the work of the young. Age grows conservative. Age hates to see change in a nation's institutions, even though they be outworn.

Stacy said, "When I returned from my job on Earth, where I had been recruited into the cell that exists among our people there, I immediately attempted to contact the basic organization here."

There was an edge of indignation in his voice. "I could make no contact! There didn't seem to be any such movement as the Jeffersonians! I began to suspect that the whole organization was merely a single cell on Earth."

The one at the end of the table was the spokesman. "It was deliberate, Citizen Temple. We had already decided upon using your services on the highest level. Until we were ready for them, however, we wished to draw no notice of Security to you. Perhaps the organization has been infiltrated and you might have been betrayed. We have kept you under surveillance, fully aware of your desire to join us."

Stacy said sourly, "Well, you're too late now. I've already decided on defection."

One of the seven, one whose age Stacy estimated at eighty plus, said in a wisp of a voice, "Wouldn't duty urge you to alleviate the shortcomings of Hamilton, rather than to flee it, Citizen Temple?"

He knew he was being defensive and the knowledge irritated him. Stacy said, gesturing with a sweep of his right hand, "Alleviate it how? Through the Jeffersonian organization, which is unknown to the man in the streets, and presided over by a handful of old men?"

To his surprise, several of them smiled.

The one who had spoken first said, "Didn't you wonder about the three men who brought you here, Citizen Temple?"

"Wonder about them?"

"Where was the ennui of nartha?"

It took him aback. He hadn't thought of that. His plump, middle-aged guide and the two goons were obviously not devotees of the pleasure drug.

The old man chuckled. "All three are diabetics, Citizen Temple. I am afraid you haven't investigated the nature of

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nartha to the extent you might. You see, it has no effect on diabetics. It also has no effect on children and little on youth until adolescence. By the age of fifty-five its potency begins to fail and by sixty there is little pleasure to be found in it."

It came to Stacy then. He made a motion of his hand. "Then those supposed servants, out front . . . "

"Are all good Jeffersonians and of an age when nartha does not as yet affect them. Unfortunately, it is desperately hard to keep them away from it as they grow older. When the whole planet sets the example, it is all but impossible not to try it *just once.*"

"And just once is enough," another sighed.

Stacy nodded. The reason for the age of the Council of Seven was clear.

He said, irritated again, "But what's the answer? Obviously, a revolutionary movement isn't going to get anywhere. Nobody gives a damn. All they want is another bolt of nartha. They couldn't care less that the government has gotten to the point where it's an open tyranny, with Norman Victor responsible to no one."

The youngest of the seven hit the desk with a fist that must once have been heavy and firm. "That's it! We were all ready to act. We had cadres of organized revolutionists. Everything was ready. Then that cursed tyrant, Norman Victor, brought in nartha from the planet Ceuta. He couldn't have suppressed us better had he killed every member of the organization."

Stacy was shaking his head, scowling still. "No, you're mistaken. Norman Victor didn't deliberately introduce nartha to the Hamiltonian populace."

All eyes were on him in disbelief.

He said, "I was called before His Leadership earlier today. He might have been a strong man once, but now he is sodden with the drug. However, he has enough gumption left to be worried about its effects on the population. He wants me to find some method of keeping it from the rising generation. He gave me carte blanche to find such a method."

"Ah. So that is why you were brought before him. We were anxious. We have held you in reserve, Stacy Temple, knowing that you were free of the nartha curse. Our active membership these days is confined to callow youth, diabetics or all-but-senile age. We need your mature vigor."

Stacy was shaking his head. "No. I have the perfect opportunity to desert this half-dead planet and I intend to take it." He started to come to his feet.

The oldest of them held up a quivering hand. "We need you, Citizen Temple. By coincidence, the very task you have been set by the tyrant should mean his collapse were you successful. Take nartha-generated ennui away and overnight the Jeffersonians would be strong again. My boy, I was born in the days when our planet was still called Jefferson, rather than Hamilton. I would live long enough to die under a government of freedom and on a planet once again named Jefferson."

Stacy took in the near-centenarian. He hadn't understood that bit about Hamilton and Jefferson. He had never heard that his world had once boasted a different name.

Of a sudden, he wanted to get away

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from them. A year ago he had been as ardent a member of the Jeffersonian cell on Earth as there was. Now, he just didn't care.

He said abruptly, "I'll think about it. I'll let you know."

He could feel the emptiness in the air. They were old men, dependent upon his own strong youth, and he was deserting them and the cause in which he had once believed.

"Very well," one said, his voice quavering in disappointment. "We shall keep in touch with you through Melvin Houst."

Melvin Houst? That must be the name of the plump diabetic, Stacy Temple decided, as he tooled his floater back to the area of the city where his apartment was located. Well, Melvin Houst was going to have his work cut out trying to bring Stacy Temple over to active participation in the Jeffersonian movement.

He entered the section of town he had chosen to live in during his wait for another assignment, the long stretches of sky-scraping apartment houses depressingly alike.

It reminded him of the fact that when he made his escape from Hamilton he was going to have to consider well where to make his new home. The most highly-developed planets such as Aldebaran Three, Avalon and Han were out so far as he was concerned. Early colonized, when man first began exploding into the galaxy, they had developed to a stage as high, or nearly so, as Earth itself. No, Stacy wanted something a bit younger as planets went; a new world where a man could find scope for his talents. Kropotkin? No, that planet, once settled by anarchists, though pysically beautiful, was *too* backward.

Actually, Hamilton itself would have not been too bad, away from the capital city, and if the government hadn't been intolerable. The government and now this energy-draining usage of nartha.

Temple brought his floater low and glided into the parking entry. He stepped out and let the auto-parker take over.

He took the elevator to his own floor, his mind still on his selection of a planet to which to defect. He stopped short, just before his hand touched the dial of his door. The door was slightly open. Someone was either inside or recently had been.

He stood there for a moment, considering the situation. He still bore the hypo-gun he had taken from Melvin Houst. He wasn't overly fond of the device, so far as weapons were concerned. It held a charge of five, one of which had already been expended, but the user had to be quite close for the drug to take effect and there was a time lapse. If the enemy was also armed, he had a good chance of finishing you off before the drug put him to temporary and harmless sleep. He decided against the hypo-gun and to rely upon his own physical resources.

In hand combat, surprise is paramount. Stacy Temple backed off a step or two and then exploded forward. He banged the door open and kept moving as fast as the confines of the rooms would allow.

He spotted a figure in the dimness of the living room, a figure with hand flashing toward a quickdraw holster.

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Still in motion, Stacy flung himself forward, then down and to the side, rolling toward the other's knees. There was a grunt of pain and the gun went clattering off somewhere. Stacy grabbed roughly, seeking a wrestling hold with which to incapacitate his opponent, who was now scuffling about on the floor with him.

He grabbed, and very suddenly realized that he had made—was making—a mistake. The kind of opponents you sought wrestling holds upon weren't usually upholstered in quite this wise. There was also a fragrance.

He tried to draw back, and his diagnosis of the mistake was confirmed when her voice grated, in rage, "Just what do you think you are about, *Colonel* Temple?"

Stacy Temple groaned inwardly, came to his feet, and helped her to hers. He even went over to the wall, recovered her pistol and proffered it to her.

He covered his retreat by assuming an indignation of his own. "I might ask the same thing, Major Raleigh. What's the idea of entering my apartment in my absence?" He went over to the light switch and flicked it alive with a gesture over its eye.

"So that's where the confounded thing was," Diana Raleigh said indignantly.

"A drink?" Stacy said, going over to the bar and dialing a pseudo-whiskey for himself. "You haven't answered my question."

She bent a beady eye on him. "Remember?" she said sarcastically. "I'm your liaison officer. You weren't home. I decided to wait." She snorted. "Make mine vermouth."

"How did you get in?"

"I'm a Security officer. Do you labor under the illusion that I can't handle any lock an ordinary citizen might have on his door?"

Stacy sighed, grinned and said, "You know, I never thought to see the day I'd consider kissing a major."

She snorted again. "Well, let me tell you something, Colonel Temple. I know a little judo myself. You took me by surprise just now. However, if you want to try again."

He laughed at her. "Darnedest invitation to wrestle with a beautiful girl I've ever had." He handed her the drink. "Sit down."

Diana Raleigh might have been a Security major, but she wasn't a martinet. She allowed herself a return of his grin before taking the offered seat.

Stacy said, "What was it you wanted to see me about?"

Diana Raleigh returned to the job. She said crisply, "I've been briefed on your assignment, Colonel Temple."

He said, "Oh, swell. I thought this was a high priority secret. How many others are going to be in a position to reveal that I'm on the most unpopular task possible on this planet?"

She said defensively, "His Leadership himself briefed me. Not even the Chancellor knows. As you say, it would be hard to conceive of a more unpopular task. Ending nartha."

Stacy said, "His Leadership doesn't want to end the use of nartha—that would deprive him of his own supply. He just doesn't want the new generation coming up to get on the stuff."

There was a twitch of contempt on her face. *So*, Stacy Temple decided, *I have a fellow in my rejection of what*

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Hamilton has become.

She put down her glass. "But I didn't come here only to tell you that I now know what we're working upon." She twisted her mouth thoughtfully. "Colonel Temple . . . "

"Oh, call me Stacy. If we're going to be wrestling around on the floor and such like, we might as well be on informal terms."

She looked at him from the corner of her eyes and gave her little snort, but said, "All right, Stacy. When we're out of hearing range of others. But here's a bit of information I stumbled upon. The Ceutans sell us nartha. Ceuta is the only source of the drug in the whole confederation. However, I've discovered that the Ceutans don't use the stuff themselves, and they don't sell it to anyone else."

Stacy Temple scowled at her.

She leaned forward, her eyes bright. "One half of all United Planets basic which Hamilton spends in imports goes to Ceuta."

"Well, what's the big mystery then? They sell us nartha to get hold of our exchange. It's the oldest motivation known."

She was shaking her head. "Ceuta is a technate, the socioeconomic system is technocracy. They don't need our money. They neither import nor export—except nartha to Hamilton."

"You mean that Ceuta is deliberately undermining the strength of Hamilton for some ulterior motive? But they're halfway across the UP from us."

"All I'm saying is that they sell us a drug which they know better than to use themselves, for large sums of interplanetary exchange. They're a self-sufficient economy, a sort of balanced aquarium."

Stacy shook his head. "I admit I don't get it."

"Well, it's something to start on, perhaps."

He brought her a fresh vermouth, but she shook her head and put it down on the small table built into the arm of her comfort chair. She looked at him brightly.

"Is there anything else, Colonel, uh, Stacy? Any orders? Perhaps now that I know a bit more about our job I can be of additional assistance."

He contemplated her for a long moment. The type of Hamiltonian woman he had known was a thing of the past with the coming of nartha. It was not that dates, dancing, romancing, sex in general had disappeared, but they had become decidedly of second importance. Not able to bring himself to use the stuff, he had become an outcast, a square, a weird. It was one of the reasons he had decided upon defecting. Eventual marriage would have been an impossibility. He wanted a wife that would be more devoted to himself and their children than to a drug.

But Diana Raleigh was allergic to the stuff and, like the diabetics, the very young and the very old, not susceptible to its charms.

There was one thing becoming increasingly clear. He could not betray this girl by taking advantage of the I.D. passes and particularly the funds she had put at his disposal.

He said experimentally, "Diana, what's the Jeffersonian movement?"

Her face froze. "I must demand that you tell me what you know about the

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Jeffersonians, Sergeant Colonel Temple!''

He had been prepared for some such response.

''Precious little. But I picked up the idea that they're accusing His Leadership of deliberately introducing nartha with the purpose of sapping the planet's ambitions and hence scotching any idea of rebellion.''

''Where did you hear that!''

He held up his hands in disgust. ''Sacred Mother Earth, how am I going to get anywhere if my liaison officer, my chief assistant and bottle washer, starts grilling me when I ask a simple question?''

She snorted. But then evidently changed her mind. She took up the earlier rejected glass of vermouth and took a pull at it.

''They're subversives. Crackpot, underground revolutionists attempting to overthrow the legal authority.''

Stacy said easily, ''They claim that His Leadership's legal authority is strictly usurpation. Anybody in complete power can pass any laws he wants.''

''Wooly thinking! Our institutions go back far beyond the time Norman Victor was born. They are basic to good government. It was the original Hamilton himself who said the powers of government should rest with the wealthy, the good and the wise.''

''The original Hamilton?'' Stacy said, scowling at her.

Diana Raleigh said grudgingly, ''We of Security are given historical education beyond the usual point. The basic institutions of this planet are based on the few scraps of teachings that have come down to us from one of the greatest political thinkers of antiquity.''

Stacy felt her out carefully. ''The way these characters on Earth had it, the Hamiltonians can't trace their institutions back as far as all that. They say that not so many generations ago the planet was named Jefferson.''

Violet eyes sparked. ''Who said that!''

Stacy finished his drink in disgust. ''How would I know? You get into one of these half-drunk debates on religion or politics. Whoever remembers who said what? I just picked up some of these off-beat ideas.''

''It was your duty to take immediate note and report the man to Security.''

He said plaintively, ''I didn't say I was talking to a fellow Hamiltonian. What are you going to do when assigned to United Planets, try to arrest all your fellow diplomats?''

She thought about it, not liking it. ''It's disloyal, even listening to such conversation.''

''Come off it,'' he said in disgust. ''His Leadership has given me the highest priority assignment on the planet. And here *you* won't answer some basic questions.''

She tightened her full mouth, loosened it again after obviously coming to a conclusion. She shot him a conciliatory look from the side of her eyes.

''It's true that our planet was once named Jefferson and governed by the mob. But before that, a few generations before, it had been named Hamilton, as it is now.''

Stacy was intrigued. ''And before that?''

She frowned in obvious puzzlement. ''There is some indication that once

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before, possibly a couple of centuries or so ago, the Jeffersonians were in power."

"What you seem to be saying," Stacy said, "is that every few generations the Hamiltonians kick the Jeffersonians out of power, and vice versa. Who was Jefferson?"

There was a snap in her voice again. "Evidently, some charlatan who was in favor of mobocracy. There is even less information on him than there is on Hamilton. It would seem that in antiquity on Earth they were rivals in the government of the USSR or the USA, or one of those early countries."

He was getting beyond the safety point. He wouldn't want to whet her curiosity to the point of checking back on him. It probably wouldn't take too much prying to reveal the fact that he, Stacy Temple, had been active in the Jeffersonian movement while over-space.

The solution to all came to him, that very moment, intuitively.

He said, "Look, Diana. Make arrangements for you and me to go to Earth soonest."

His call to report to the offices of Norman Victor came early in the morning. However, he had more or less expected it and wasn't fazed.

Just before leaving his apartment, his phone summoned him again.

The face that lit the screen was that of Melvin Houst.

Stacy said, "I'm on my way to an interview at the New White House. Be out in front of my apartment in a few minutes and we can talk on my way over."

What he was saying was that his apartment was possibly bugged. The homes of practically every person of any consequence on Hamilton had a bug or two tucked here or there.

Houst hesitated, then nodded. His face faded.

Stacy descended to the building's garage, spoke his car's code into the auto-parker and waited for its delivery.

By the time he floated from the lift ramp, Melvin Houst was waiting for him on the street level. Stacy opened the door for him, then headed for the White House.

Houst said, "Well . . . "

"You can report to the Council that I am going through with my assignment to end the use of nartha. Whether or not I'll succeed is moot. If I do, whether or not it will help the Jeffersonian movement is moot again. But I wish you luck."

Houst looked at him questioningly. "Wish you luck? You mean wish us luck. You're a member of the organization too."

Stacy shook his head. "This mission is going to take me over-space and I won't be coming back."

Houst thought about it. He wheezed a fat sigh. "This isn't going to fit in with some of the Council's plans."

Stacy said sourly, "That's too bad."

He dropped the Jeffersonian at a street corner and continued to the parking lot of the New White House. He found a space less than a mile from the main building and on summons a three-wheeler came to pick him up.

Major Diana Raleigh, erect and crisp in her Security uniform, was awaiting him at the main doors.

She said, "His Leadership is ex-

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pecting you, Sergeant Colonel Temple," and showed him the way.

As they strode down the long corridors to Norman Victor's personal quarters, Stacy said from the side of his mouth, "I've still got that ambition to kiss a major."

She said, her voice very even, "We simply must find the opportunity some time, Colonel, to practice our judo."

He chuckled lowly. Yes, very definitely, he was going to have to fall in love with Major Diana Raleigh.

He said, more seriously, "Have you made the arrangements for our trip to Earth?"

She said, "That is what His Leadership wished to discuss with you."

"That's not what I asked, Major. Please be more alert."

She shot a scornful look at him from the side of her eyes. "Given His Leadership's final permission, we can be underway this afternoon."

He told her cheerfully, "You had better get packed."

"I can wait," she said.

She ushered him through the usual guards, through this office, through that, down this hall and that. They finally wound up for their ultimate Security check before the offices of the tyrant and suffered through the grueling routine. At least he did. Diana, being a Security major herself, wasn't more than slightly scanned.

Stacy Temple was finally cleared and the door opened for him. Diana remained in the anteroom as she had the preceding day.

Norman Victor was halfway between bolts, neither feeling the complete apathy that followed indulgence nor the anticipation of new ecstasy. Thus it was that he seemed more alert to Stacy Temple than he had on the occasion of their first interview.

Stacy Temple was not a military man, in spite of his newly created rank, but he came to attention.

The tyrant of Hamilton grunted, "Relax, liegeman. Take that chair. I think that you'll find it comfortable."

That, at least, was a good sign. Stacy had remained standing throughout the whole interview before.

The one-man ruler scanned a brief report before him. He grunted again. "I fail to see how a journey to Earth would further your assignment."

"May I speak freely, Your Leadership?"

"You are ordered to, without reserve, liegeman."

Stacy leaned forward. "It was something that the efficient Major Raleigh mentioned, sire. She revealed that the Ceutans do not, themselves, use nartha. Nor do they sell it elsewhere."

Norman Victor said gruffly, "I fail to see the significance."

"Sire, what are Articles One and Two of the United Planets Charter?"

Norman Victor's eyes narrowed in sudden comprehension. He recited, in thought, "Article One: *The United Planets organization shall take no steps to interfere with the internal political, socioeconomic, or religious institutions of its member planets.* Article Two: *No member planet of United Planets shall interfere with the internal political, socioeconomic, or religious institutions of any other member planet.*"

The tyrant's eyes came back to his underling. "Develop your point," he

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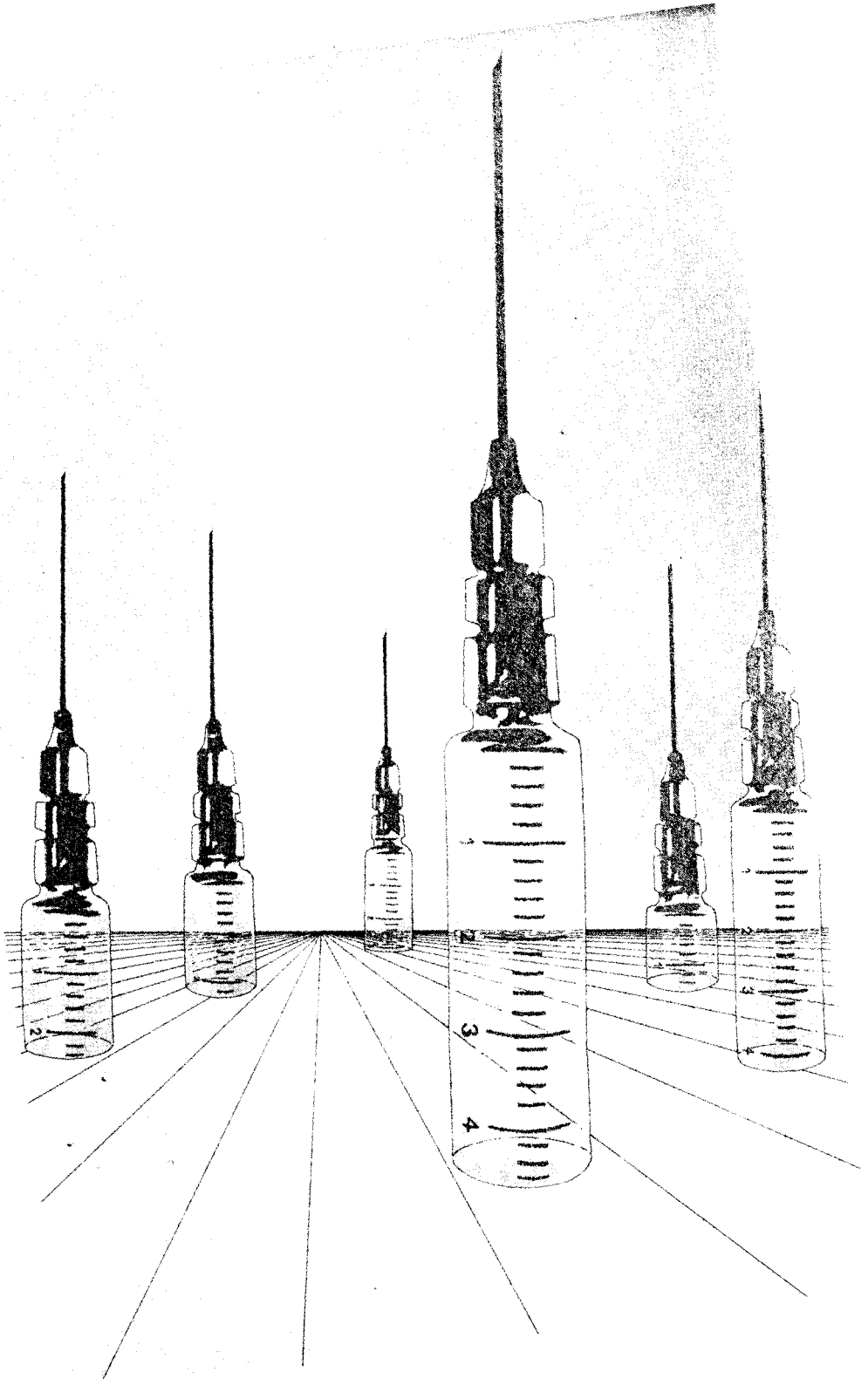

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ordered in an even tone of voice.

"Your Leadership, I contend that selling nartha to Hamilton is interfering with our socioeconomic system by causing lethargy among our people and slowing down production and progress. If we take the matter to the Commissariat of Interplanetary Affairs, Ceuta can be pressured into discontinuing the trade."

The tyrant growled, "Are you planning my end, liegeman? If the word went out that I had caused the discontinuation of the import of nartha, I'd be on the run before nightfall."

Stacy leaned forward again, his roughhewn visage urgent. "They wouldn't know, sire. I am well acquainted with Ross Metaxa of the Department of Justice of the Commissariat. Upon explanation of the problem, he will most certainly handle the Ceutans with discretion and finesse. The citizens of Hamilton will never know that through your actions nartha has been denied them."

The older man's eyes narrowed. "I told you once, liegeman, that I have no intentions of giving up the pleasure of nartha myself."

"Nor need you. You've been forewarned. Lay in a private stock sufficient to last throughout your years."

"But the effect on those who will then be denied!"

Stacy shifted his well-set shoulders in a shrug. "There are no narcotic qualities to nartha. No withdrawal symptoms, no physical effects save the lethargy that would follow even a prolonged drinking bout. The attachment is psychological alone, not addiction."

The aging tyrant shifted his glance from one end of the office to the other. He obviously wasn't as quick on decisions as he had once been.

He said, softly, "I am informed that our compatriots on Earth include a veritable hotbed of Jeffersonians."

Stacy didn't allow himself to swallow. He said, "Am I free to speak, Your Leadership?"

"You are ordered to, without reserve, liegeman."

Stacy said, "Sire, I would be a fool to deny that I am aware of the Jeffersonians. Anyone ever stationed on Earth runs into some of the crackpots who talk about it. But my experience has been that the so-called leaders are a group of near-senile old men. I cannot see them as much of a danger to the government of Hamilton."

The tyrant of Hamilton had evidently heard all that he needed. He said, "Very well, liegeman. I will give orders to have you delegated my personal envoy to United Planets, traveling under top priority and top secret orders. Major Raleigh will handle the details." He looked as though, in way of celebration, he was going to take an extra bolt this morning.

At the spaceport, he at first failed to recognize Major Diana Raleigh. She was no longer garbed in stiff Security uniform but the currently popular sari-like dress. There is possibly no more feminine attire ever devised than the sari and its gentle folds draped about the slim though curvaceous figure of Diana Raleigh failed to alter that fact—in spades.

"Holy smog," Stacy moaned.

She was taken aback. "But

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. . . what's the matter, Colonel . . . that is, Stacy?''

He said, in dismay, ''Major, I'm used to you in uniform. Our date to wrestle. I refuse to wrestle, even judo style, with a young lady in that get-up.''

She snorted. ''You'll have to get out of the habit of calling me Major.''

''A pleasure.''

''Since a Security officer from Hamilton would bring raised eyebrows on Earth, you'll have to introduce me as your . . . ''

''Wife, mistress, girl friend?''

She glared at him scornfully. '' . . . secretary. You'll remain Sergeant Colonel Temple, but I'll be Miss Raleigh.''

''Shucks.''

''You're not taking this assignment very seriously, Colonel Temple.''

A young officer in the uniform of a United Planets Space Forces ensign came up and flicked them a neat salute. ''Colonel Temple, Miss Raleigh, are you ready to embark? We burn off in half an hour.'' His eyes were on Diana Raleigh in admiration he made no attempt to disguise.

Stacy said coldly, ''Lead on, we're all set.''

Diana said, her eyes failing to meet the youngster's in a burlesque of shyness obvious to Stacy but lost on the ensign, ''*Anything* you say, Captain.''

He beamed at her.

It was but a few minutes until burn off before they could shake the young man, who managed to develop a stammer, a tangle-footed ability to foul up everything he attempted to do for them, and an absolute inability to take his eyes off the silken-clad Diana, even though it meant falling flat on his face.

When they were finally alone, immediately before strapping down, Stacy said, ''What're you trying to do, disrupt the crew even before we're spaceborne?''

''Why, Stacy,'' she said demurely. ''It was you, yourself, who brought home to me the fact that I was, after all, a woman. And how sweetly, how romantically, you put it. You said you'd never wanted to kiss a major before and offered to wrestle me, judo style.''

Something became evident early in the eight-and-a-half-day trip. The officers of the s/s *Goddard*, space cruiser of the United Planets, were a far cry from the men with whom Diana Raleigh had come in contact during the years she had been a mature woman. Participants in man's dream of conquering the stars, there was no sign in them of the nartha-induced lassitude, the lethargy, the ennui of the typical Hamiltonian male. None whatsoever.

Stacy Temple was pushed. He hadn't planned to mount his offensive this early in the game.

However, if he was going to make way with Diana Raleigh he was going to have to get in there but quick. There were eight officers aboard the *Goddard* and only one of them had a wife at home. Space cruisers seldom have a woman aboard. For that matter, they seldom carry passengers; this was a special favor to the tyrant of Hamilton. But the crew of the *Goddard* was delighted.

The first day Stacy had his work cut out for him getting near enough to her for conversation. He began to wonder if any of the *Goddard's* officers ever stood a watch or held down other duty.

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The whole complement seemed able to devote full time to prancing around Diana.

The second day, in desperation, he declared they had work to do and insisted they confine themselves to their suite, which consisted of two cabins and a connecting lounge-cum-office. He tried to get back on their bantering basis but it was no dice. Diana Raleigh was having the time of her life. Never before had she had the attentions of a half dozen completely virile men, all competing for her.

She said, and there was mockery there, "What is this mysterious work, Colonel . . . "

"Call me Stacy, damn it."

" . . . Stacy? I didn't know we had anything to do before touching down on Earth."

"I've just got to the point of nausea watching that bunch of sex-starved . . . "

"Why, *Stacy*!"

" . . . space rats, pawing and panting around you."

"Pawing? Now really, Colonel."

"Well, they'd like to."

Her mouth turned down demurely. "Wasn't it you who was continually talking about wrestling, Colonel . . . "

"Call me Stacy"

She snorted her amusement at him. "Then there isn't anything for us to do until we touch down on Earth?"

"No," he grumbled.

"No particular reason for us to be locked up here together?"

He glared at her. "No, except that I'd think you'd be ashamed to be openly flirting with that bunch of . . . "

"I know, space rats. However, I find the rodents charming. And, if you're sure there is nothing you need me for, I have a date with Lieutenant Williamson. He's going to teach me to play Battle Chess."

"I can teach you to play Battle Chess."

She smiled at him sweetly, over her shoulder. "But the Lieutenant asked me first."

The last of his last bulwarks fell the following day.

Diana had changed from sari to halter and shorts to be freer in teaching half a dozen of her *Goddard* admirers the currently popular Hamiltonian dance. To Stacy's horror, the 'Fantastic' turned out to be quite so. Especially when you saw it performed by the woman you loved before a group of drooling louts who didn't realize that—well—didn't realize.

He bore it for possibly ten minutes, while she demonstrated solo. But when she came to a halt and gestured toward the executive officer to take a lesson as her partner, he could stand it no longer. The idea of her body being held, gyrating . . .

"Miss Raleigh!" he blatted in a tone that rung through the room.

All eyes went to him, those of the exec scowling.

"Yes, Colonel," she said demurely.

"I've just thought of some letters we should cut."

"Why, Colonel, I thought you said we'd be free until Earth."

The witch.

He said, feeling like a blithering idiot before the unhappy ship's students of the dance, "I forgot until just now."

The exec grunted skepticism, but

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Stacy Temple turned and led the way to their suite.

There she looked at him scornfully. "Now, really, Stacy."

He looked her full in the face. "Listen, will you marry me?"

"Why, of course."

He stared at her. "You will?" He was astounded.

"Of course, darling."

"Well, I'll be damned."

The sides of her mouth quirked, immediately before she came into his arms. "I hope that isn't a very accurate description of our married life."

The more immediate, practical aspects of their future didn't intrude upon them until the day they were scheduled to set down at Neuve Albuquerque spaceport, although they had discussed almost every element of their life to be, from double beds to the number of children, from his favorite food to her style of apartment. It would seem that there were few secrets between them, certainly no deliberate ones.

They were seated on the small leather couch of their office-lounge, he sitting erect, she sprawled on her side, facing him so that he could hold her. She was gently running her forefinger over the lobe of his ear, which he found most distracting, especially when he was trying to find serious words for the first time in nearly a week.

He said, "Darling, do you realize that we're in the perfect situation to take these dreams of ours to the most perfect planet in the confederation? That we have no need to return to Hamilton?"

She said sleepily, "No need to return to Hamilton?"

"Of course not. The first day I met you I could see you were as fed up as I've been. Darling, there are living, growing, dynamic worlds newly being discovered and colonized. We've got at our disposal an almost limitless amount of UP basic. On Earth, we can take the steps to end Ceuta's sale of nartha to Hamilton. We actually wouldn't have to bother, but I think it a suitable gesture, sort of a payment for the interplanetary exchange we'll take along with us. Then we'll disappear into the stars."

"You're joking?" she said, looking up at him in amazement.

"Of course not. Look, darling, it's the chance of our lives. We both hate nartha and what it's done to Hamilton. If this project of mine doesn't work out, we'd neither of us ever want to go back."

"You're only speaking for yourself, Stacy."

"Don't look like that. Sure, we were both born on Hamilton and have ties there, but there are newer planets and better ones."

"Hamilton will be better after we eliminate nartha."

He shook his head. "That's what I've got to tell you. If nartha *is* abolished then chaos is going to set in. The Jeffersonians will move. They're all set to go once the lethargy of nartha is removed from the citizenry."

She sat bolt erect and snapped, "How do you know this?"

"Darling, darling." He tried to reach for her but she held back. "Try to forget about being a Security major. You know you hated Hamilton. I happened to be a Jeffersonian while I was on Earth

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before. I dropped away—you see, I'm telling you everything—but just recently they contacted me again. They're of the opinion that when nartha's use is ended they can take over."

She stood erect and stared down at him, wordlessly, at first. Then, "And you want to . . . to *steal* the interplanetary exchange the government has entrusted us with and desert the ship like a . . . "

"Diana, come off it! We wouldn't be stealing money from a legal government. We'd be, well, you might say, confiscating it from a tyrant who is on the verge of being toppled in any case."

She said coldly, "No matter whose hands the government is in, the money belongs to Hamilton. If we were on Hamilton soil, it would be my duty to arrest you, Stacy Temple."

Stacy said in anguish, "But darling, you've indicated a score of times that you were completely disgusted with the planet."

"You didn't read me right, Colonel Temple," Diana Raleigh said emptily. "You see, no matter how I might feel about nartha and its effects on our people, I couldn't desert my father in this time of crisis."

"Your father? You've never mentioned your family. I thought that—like myself—you didn't have one."

"My name, Colonel Temple, is Diana Raleigh Victor. Since I am strongly opposed to nepotism, I took my mother's name so that my career wouldn't be influenced by the fact that His Leadership is my parent."

Whether or not Diana was going to be able to revoke his unlimited recourse to Hamiltonian interplanetary exchange, Stacy Temple didn't know. For that matter, he didn't particularly care. Nothing particularly mattered to him. He assumed that she would attempt to take some steps both to warn her father and to thwart him.

He had conducted himself like an idiot. How had it ever been possible for his relationship with Diana to have gotten so far without his getting a clue to her identity? Certainly the tyrant of Hamilton had made a fetish of keeping his personal life out of the public eye. However, far in the back of his mind, Stacy had known that the dictator had married one of the prestigious Raleigh family and that he had had a child by her. No wonder Norman Victor had been so openhanded about granting Stacy Temple such sweeping resources—his own daughter was keeping tabs on him.

Well, she had disappeared at the earliest moment, upon setting down at Neuve Albuquerque. He assumed that she was making a beeline for the Hamilton embassy in Greater Washington. Probably chartering an aircraft.

He took his own time and waited for the regular shuttle rocket.

In Greater Washington, he decided it would be a mistake to go to the embassy himself. The Hamiltonian Embassy was, after all, legally the soil of Hamilton and a certain Major Raleigh might be willing and able to place him under arrest there on a security charge.

He decided, listlessly, that he still had a job to do and that he might as well do it. The job took him to the Octagon, that sprawling monstrosity stretching over an area which in days

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past would have encompassed a fair-sized city.

An auto-cab took him to one of the eight main entrances. He pressed his credit card to its screen, got out and watched it disappear back into the traffic. He turned to one of the guards.

"I represent the sovereign planet of Hamilton," he told that unimpressed worthy. "I'm here on a special mission for His Leadership, Norman Victor. I wish to see Ross Metaxa, Section G, Bureau of Investigation, Department of Justice, Commissariat of Interplanetary Affairs."

The guard said, "I can send you over to the Bureau of Investigation, Colonel, but how you get treated there is out of my hands."

"Thank you," Stacy said.

The guard summoned a three-wheel and fed some coordinates into it. He flipped Stacy an easy salute as the other climbed into the bucket seat.

During his years with the Hamilton delegation to UP, Stacy had found occasion several times to enter the Octagon. However, it had never failed to astonish him by its sheer magnitude. Now he went up and down halls, ascended ramps on several occasions, and even after reaching the confines of the Commissariat of Interplanetary Affairs, had to go at least a mile to find Section G of the Bureau of Investigation.

He vaguely remembered Ross Metaxa's secretary, a harrassed and sharp-tongued type who evidently was one of that breed of super-secretary which no product of the automation engineer's genius will ever eliminate.

She looked up at him snappishly and said, "Stacy Temple. I thought you'd finished your tour. I suppose you wish to see the Commissioner."

"Correct. But in official capacity. I am on special mission from the tyrant of Hamilton."

She turned brisk. "I can let you have ten minutes. Through that door and to the left."

Stacy thanked her, went through that door and to the left and wound up before another door lettered inconspicuously, *Ross Metaxa, Commissioner, Section G*. It came back to Stacy Temple how quietly discreet Metaxa kept his cloak-and-dagger department.

Ross Metaxa looked up wearily from his desk, which was strewn with thick masses of reports. He was in the middle years, sour of mien and moist of eyes, as though he either drank too much or slept too little—or both.

"Stacy!" he said. "Thought you were back in the God-forsaken, dictator-ridden home world of yours."

Stacy shook the hand extended to him over the desk.

He said, "We'll skip that dirty crack. The fact is, I'm here to invoke Article Two. Our affairs are being interfered with by Ceuta, which is disrupting our economy by selling us nartha, an enervating narcotic."

Metaxa had been leaning back in his chair, his heels on his desk. Now he swung his feet around and came erect. He said into his order-box, "Irene, give me an immediate brief on Ceuta, one on Hamilton and one on their interrelations, if any."

He clicked off and grumbled to Stacy, "I thought Ceuta was one of these self-sufficient economies."

"That's what makes us smell a rat.

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The Ceutans themselves don't use this drug. So far as we can figure out, they don't seem to sell it to anyone else but us. Why? And what do they want the interplanetary exchange for?"

Metaxa said into his order-box, "Give me a brief on the Ceutan drug nartha." He looked up at Stacy. "Let's have your story in more detail."

Stacy gave it to him in detail.

While he was talking, various reports were deposited in the other's order-box. Metaxa scanned them, growling, "Keep going. I'm hearing everything you say."

When he had finished, Metaxa said, "Nartha isn't a narcotic."

"It's effect is as bad as one," Stacy said angrily. "Why do they sell it only to us?"

Metaxa said, "Probably because nobody else wants it. It would seem that only the Hamiltonian metabolism is affected by this nartha." He held up a hand to cut Stacy off. "I know, I know, theoretically we're all *Homo sapiens*. But there are at least *subtle* differences between inhabitants of each planet. As far back as when we were all confined to Earth that applied between races. The Amerinds were notoriously unable to handle the white man's fire water, and the Caucasians were unable to use opium as the Orientals could, nor some cannabis as could the Indians and Arabs. One race's mild narcotic was another's deadly habit-forming poison. Well, if this was so on Earth alone, you can image how we change under the influence of alien environments."

Stacy Temple said, "Nevertheless, selling it to us is destroying our world."

The order-box said something Stacy couldn't make out. Metaxa said into it, "All right, all right." He turned back to Stacy. "I've got an appointment. There are some interesting angles to this situation. I'll look into it."

He twisted his mouth sourly. "However, remember this. Don't read into the United Planets more than is there. It's a weak, all-but-powerless organization, each member fearful of having its sovereignty encroached upon. That's why Articles One and Two are so basically important. Within our membership we have every religion, every political form, every socioeconomic system ever devised by man. A planet organized on a feudalistic basis is scared to death of creeping capitalism. A world colonized by born-again Buddhist doesn't want a batch of Christian or Mohammedan missionaries coming around. A monarchy abhores the idea of its people even learning that such governments exist as the democracy that prevails on, say, Catalina; both shudder at the anarchism of Kropotkin; and all three hate the syndicalism of the planet Haywood. And so it goes."

He grunted sourly, "If any of these planets suspected that UP was condoning interference in their domestic affairs, they'd drop out like dandruff."

"Why not let them?" Stacy said. He'd never heard the grumpy Ross Metaxa be quite so free.

Ross glowered at him. "Because, little though UP's real strength might be, it is, at least, some control over man's outflowing into the galaxy. At least we can prevent war between rival planets. At least we can disseminate new scientific progress. At least we have a modicum of directing our species."

He came to his feet. "So, you see,

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we have to tread lightly on this Ceutan matter. If they take umbrage, all they have to do is resign their membership. However, hang on. I'll get back in touch with you as soon as I know anything."

Stacy Temple hung on, as requested. In fact, he went to ground. He had no desire to make himself known to former friends, especially Hamiltonians stationed on Earth.

There was a bitter note in it all, now that he looked back. He realized that when it had come to the sticking point, he would never have been able to have absconded with the interplanetary credits. It simply wasn't in his nature. Defect from Hamilton? Yes, he might have, though even there, sense of duty urged him to stay and help with the planet's burdens.

Well, it was all past now. There was no return now. And for the time being he was living frugally, depending on his own meager resources.

To the extent possible, he kept his mind from his relationship with the girl. He didn't want to think about it. Why he had bothered to go to Metaxa with his complaint against the Ceutans, he didn't know. What he was going to do when his small personal savings had been expended, he didn't know either. Most certainly, he didn't have the resources to select a new planet and emigrate there.

He stagnated, unable to come to a plan of action. On the few occasions he tried to get back in contact with Ross Metaxa, he was put off by the efficient machine secretary and he suspected the Section G head was giving him the brushoff.

His time was spent largely in the Galactic Library and in fascinated study of Earth history and that of Hamilton.

For though local governments might rewrite, hide, or even erase the history of their own planets, as religious or politico-economic needs dictated, Earth's central archives remained inviolate. Thus it was he became acquainted with the works of Thomas Jefferson and of Alexander Hamilton, of Madison, Paine, Jay, Adams, Burr and those other revolutionists of early America who were the seminal factor changing the destinies of a score of lands and the face of the world of their time.

Thus it was that he studied the strange history of his own planet, of Hamilton-Jefferson, and here it was that he was approached by an easy-going, average-looking young man of less than thirty. Somewhat sloppy of dress and with hair inclined to be on the unruly side, Stacy wouldn't have thought of him as one of Ross Metaxa's supposedly ultra-efficient operatives.

The newcomer said easily, "Sergeant Colonel Temple? My name's Ronald Bronston. Section G. The Old Man asked me to pick you up and bring you to the Hamiltonian Embassy."

"You mean that fair-weather friend, Metaxa, I assume," Stacy said. "Tell Ross I haven't any desire to go to the Hamilton Embassy. Tell him I'm not *that* stupid."

Bronston said easily, "I'm afraid my orders are to bring you."

Stacy Temple came to his feet and looked the other up and down. Bronston was of average height, weight and breadth. Stacy towered a good four or five inches above him, with brawn to

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match. He said, "Oh now, really."

The other chuckled in genuine amusement. "It would be fun to see what the librarians would do if we started going round and round," he said. "But come off it, Temple. You know darn well if Ross Metaxa says to bring you to the Hamilton Embassy you'll wind up there, one way or the other."

Stacy glowered at him, then came to a sudden decision. "All right," he surrendered. "Let's go." He still had a basic trust in Ross Metaxa.

The ornate building which housed the embassy of the Democratic Tyranny of Hamilton was well known to Stacy Temple. How very well known. A thousand times the Hamiltonian guards with their muffleguns had starched to the salute when he had entered these doors. Strangely, there were no guards today.

Stacy looked at his companion. "Where am I supposed to go?"

"The Blue Room, the Old Man said." Ronald Bronston looked about him.

"The Blue Room's this way," Stacy said, leading.

There was no guard here, either. Stacy Temple had an uncomfortable feeling of something being up. Was he being sucked in? For that matter, who was this Ronald Bronston, supposedly from Metaxa? All he had seen was a badge. Anybody can acquire a buzzer.

However, if it was a trap, he was already in it. He shrugged and opened the door.

At the heavy table there, the conference table with its double score of heavy leathern chairs, sat Ross Metaxa, rumpled and as moist of eye as ever. And next to him, Melvin Houst, the Jeffersonian, last seen on Hamilton.

Houst came to his feet, as though respectfully.

Bronston bringing up he rear, Stacy entered the room fully, scowling. "What's going on?" he said.

The plump little Hamiltonian began to answer but Metaxa quieted him with a motion of the hand. "Sit down, Stacy," he said. "A lot's been going on in the past six weeks or so. By the way," he added gruffly, "thanks for keeping out of the way so efficiently."

Melvin Houst chuckled, as though the statement was meant to be humorous. Stacy looked at him, not being able to figure out the other's attitude. The man's expression was halfway between fawning and a cringe.

Metaxa said wearily, "Okay. The rest of you shut up for a minute and let me go into my act. I've got a lot to tell you, Stacy."

A door opened behind the Section G commissioner and a voice said, "Undoubtedly, it can wait. Stacy Temple, I place you under arrest on a charge of subversion against the sovereign planet of Hamilton and His Leadership Norman Victor."

Ross Metaxa spun in his chair.

But Stacy could see her well from where he sat; and the two armed Security boys who flanked her, one on each side.

Metaxa snapped, "Ronny!"

The mild-mannered Section G operative crouched and his right hand blurred toward his left shoulder.

But the Security guards were already gun in hand. There was a double crackle

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in the air and the slightly-built agent stiffened and dropped to the floor.

They were all on their feet. Ross Metaxa said in fury, "Major, I don't know who you are or what you think you're doing but unhappily I'm unarmed, otherwise you would have two deaths on your hands."

Diana Raleigh's face was pale, her mouth trembling, but she managed to get out, "The flat isn't hurt, only muffled for an hour or so. Don't your men ever give up when they're covered?"

"No," Metaxa said furiously. "And you'll answer for this attack."

Stacy's eyes darted toward the heavy chair which sat between him and the Security trio. If they had their guns tuned for low muffle, he possibly could use the piece of furniture for a shield long enough to get to them. He tensed, preparatory to going into action

Diana was saying, "You forget, Mr. Metaxa, that this is the Hamiltonian Embassy and you are at present on Hamilton soil."

But still another voice intruded now. It came from behind her. "I'm afraid you are mistaken, Diana. It would seem that we are all on Jeffersonian soil."

"Father! But you should be back on Hamilton. There's crisis!"

A seemingly greatly-aged Norman Victor plodded into the room. He sank into one of the chairs, several seats removed from where the others had been seated.

He snarled to the Security goons who had accompanied Diana in her arrest attempt. "Put away those confounded guns." They clumsily, in their haste, hustled them away and Norman Victor muttered and turned to Stacy Temple. "Although I suppose it is you who should be giving the orders."

Stacy stared at him blankly.

Metaxa had bent over his agent, satisfying himself that Bronston was truly not seriously injured. He stood again, glared at the two bully boys and said, "You get this man into a comfortable bed and call a medico."

They got, obeying orders in fearful speed.

Diana had sunk into a chair, her head in her hands.

Metaxa said, "All right, all right. Let's all sit down again and get this thing finalized. I've got other business. The Ceutan ambassador should be here but evidently hasn't arrived as yet. Citizen Houst, I suppose that your report should come first."

It wasn't exactly a report. Even as Stacy stared his disbelief, Melvin Houst looked at him and said, "Your Leadership, may I speak?"

Had he suddenly levitated and passed through the window, he couldn't have flabbergasted Stacy Temple the more. A full minute must have elapsed before he heard a voice that surely couldn't have been his own say, "You are ordered to, without reserve."

Houst said fervently, "Then, sire, let me tell you that the revolt is everywhere successful and the Council of Seven has appointed you temporary Chief of State of the interim government of the planet Jefferson until elections can be arranged."

"Wait a minute!" Stacy blurted. "Why me?"

"Through my suggestion," Metaxa growled.

"Which was in turn through mine,"

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Norman Victor added softly.

Houst said, "The Council has had Citizen Temple in mind for the appointment for some time. They have no need of your suggestions."

But Stacy was eyeing the former tyrant unbelievingly. "Through yours! Has everybody gone completely mad around here?"

Diana had brought her head up and was staring from one of them to the next, as completely disorganized as Stacy himself.

Houst said urgently, "Your Leadership . . . "

"Stop calling me that!" Stacy rasped. "If your revolution has been pulled off the last thing you want is to continue the very aspects of government you revolted against."

Houst was taken aback. "Yes, sire."

Norman Victor said wearily, "If you don't mind, Temple, I suggest that we ask these others, save Citizen Metaxa, to retire. I have words for your ears only."

Diana came to her feet. The Security major's uniform looked ludicrous on her. She was a girl. A woman. Never a major of Security. She looked at Stacy Temple, at her father, then back to the man she had loved. She turned and left the room by the door through which her father had entered, Melvin Houst bustling behind her.

When Metaxa, Stacy and Norman Victor were alone, the latter said, his voice tired, "My agents informed me that you have been studying the historical archives pertaining to Hamilton . . . that is, Jefferson."

Stacy nodded, still completely confused, still bewildered.

"Then you'll be somewhat familiar with most of what I am about to say, Stacy Temple. I'll keep it brief."

Before going on, the former tyrant looked thoughtfully at the silent commissioner of Section G. He said softly, "I wonder to what extent member planets realize how far your department goes to subvert the very UP Charter articles you supposedly defend."

Ross Metaxa's eyes narrowed dangerously. "I suggest you keep such ideas to yourself. Remember that the Jeffersonians have demanded your extradition for trial."

Norman Victor said, "I have no intention of forgetting."

He turned back to Stacy. "As you now know, our planet was settled by two groups, one adherents of the political theories of the early American patriot, Hamilton; and the other, his political opponent Jefferson. Their differences were irreconcilable and soon the Hamiltonians prevailed, establishing a rule by an oligarchy composed of the wealthier, better-educated classes.

"However, the rule by a true elite seldom perpetuates itself. There have been few times in history where man rose above himself to the point of being able to abjure nepotism, and it is seldom that a son truly follows in his father's footsteps. Exceptions, of course. Philip and Alexander the Great were one. However, even a Napoleon must have realized that the Prince of Rome would hardly have continued his military genius, his ability to administer and to build a team. Would that have prevented him from seeing his sickly son assume the Emperor's mantle? Probably not.

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"No," he continued wryly, "an elite might take the reins of government in full efficiency, but the second generation perpetuates itself in power, not necessarily still consisting of the nation's elite. And the third generation?" He made a gesture of deprecation. "By this time they are maintaining themselves by police force, by superstition, by economic domination, and by every other means available. The rule of the elite has become the rule of incompetent despots."

His deep breath was a sigh. "So it was on early Hamilton. And as inefficiency and despotism grew, the more competent of the suppressed classes organized to overthrow the oligarchy. The need produced the men, and the best elements of the planet drew together. Secretly, such works as remained of Jefferson and other political thinkers of Mother Earth were circulated. Eventually, the explosion came and the Jeffersonians took over, changing the name of the planet in their ardor."

He paused a moment before continuing. "Ardor is the only term, since the need for change had produced literal giants among men, and these popular giants were voted in by the cheering, eagerly-participating citizenry. They became the elected officials of the new government, drew up a new constitution, established progressive legal codes and so on."

He grunted deprecation again. "That was the first generation. I suppose I needn't go into detail about what happened during the succeeding three or four. Democracy is practical only among peers interested vitally in government. The population of Jefferson did not consist of peers. Among other things, they differed greatly in material wealth since the economic system was one of free enterprise. Those with the greater power soon dominated the political parties and the electorate grew cynical."

"And so," Stacy said, "there was another upheaval."

Norman Victor nodded. "The Hamiltonian tradition had still persisted, though secretly, among intellectuals and sincerely dedicated men of good will. An oligarchy of wise, wealthy and efficient men took over leadership and the name of our world was changed back to Hamilton."

"And so it has continued down over the centuries," growled Ross Metaxa. "I'd say your planet was in a rut."

"To the contrary," Stacy said thoughtfully. "It is not in a rut. That has been the secret of its success. In a way, you might say both Jefferson and Hamilton have been vindicated. Jeffersonian democracy worked beautifully in the early flush of the success of the American Revolution of 1776. But wasn't it Jefferson himself who said, 'The tree of liberty must be refreshed from time to time with the blood of patriots and tyrants?' So it's been on our planet. Every few generations, we refresh it."

Stacy turned back to the former tyrant. "But what's this about you recommending me to be temporary chief of state until new elections?"

Norman Vicor shrugged his weariness. He hadn't had his bolt this morning and he suspected he wasn't going to have one this afternoon either. The thought irritated him. However, he said now, "When the Ceutans, through the

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actions of Commissioner Metaxa here, discontinued sale of nartha upon Hamilton, your Council of Seven, spurred, I suspect, by Section G, spared no time in spreading the word that it was through my actions that the drug was withdrawn. My government fell, and since I have no interest in supplying any of the tyrant blood with which Jefferson advocated the tree of liberty be refreshed, I fled here to Earth. I suggested to the commissioner that you be recommended to head the new provisional state, because, of all Jeffersonians I know, you are mature and experienced, never having been touched by nartha."

Stacy looked at him in puzzlement.

Norman Victor said wryly, "You must realize that though I am the deposed tyrant of Hamilton, I am still a son of the planet of my birth and have served it to the best of my ability for the greater part of my life. I have not been unaware that a new change was at hand. My own long-term plans in many respects coincided with those of the Council of Seven. Remember that it was I who sought you out and started you along the path that has resulted in you, at least temporarily, assuming my position. No. Governments will come and go but the planet of Hamilton-Jefferson will go on. Today, the star of the Jeffersonians is on the ascendancy. But there is tomorrow. Not that I will see it. I have been granted political asylum on Ceuta." He smiled wanly. "I suppose there is some cynical moral to be found in that."

He came to his feet, obviously in preparation to leave. His face twisted wryly. "In further explanation of my suggesting you as chief of state, you might recall what I said about the nepotism of we who proclaim ourselves the elite. Perhaps I am interested in seeing my son-in-law perpetuate the family in a position of power."

The main door through which Stacy had come half an hour earlier opened and an unknown stuck his head in. "The Ceutan Ambassador," he announced.

Norman Victor said, "I'll go."

Stacy Temple stood. He held out a hand. "Your Leadership, may I speak?"

Norman Victor looked into his face for sarcasm and found none. He said, for the last time, "You are ordered to, without reserve . . . liegeman."

Stacy said softly, even as they shook hands, "The term tyrant is an elastic one, sire. I hardly envy you the job you have held down the past twenty years."

The other turned and left.

Ross Metaxa growled, "That was a tender scene. In the good old days, revolutionists used to string dictators up by their heels from lampposts."

"Shut up, Ross," Stacy said. "The times make the men, but the men make the times. Every tyrant our race has seen hasn't necessarily been a disaster to Homo sapiens' career. Remember Miltiades? How did Byron put it:

"The tyrant of the Chersonese
"Was freedom's best and bravest friend
"That tyrant was Miltiades
"Oh, that the present hour would lend
"Another despot of the kind
"Such bonds as his would never bind."

The Ceutan ambassador entered. He

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was a harried-looking, dark-complexioned man, obviously of Iberian ancestry. There was a dream-like quality in his eyes that Stacy couldn't remember ever having witnessed before. Metaxa made introductions.

When the three of them were seated again, Stacy said, "I don't believe I am acquainted with the reason for our coming together. I must admit, I don't appreciate the introduction of nartha to the planet of Ham . . . of Jefferson."

Ross Metaxa grunted, darted a quick look at his watch. "I'm neat, that's the reason."

Stacy took in the rumpled suit of the commissioner and deliberately looked sarcastic.

"I mean in matters pertaining to inter-planetary affairs," Metaxa growled. "I think it best to wrap this all up. Ceuta developed a pleasure pill which reacts mildly on all members of the race except Hamiltonians . . . that is, Jeffersonians. Since they need interplanetary exchange, they sold it in large amounts to your planet and disrupted your people. My department took action."

"How?" Stacy said.

"By subsidizing Ceuta with the interplanetary basic she required, until she can so alter her economy that she can export other products. The need no longer being there, Ceuta was glad to comply and cut off your supply of nartha." Metaxa waited for Stacy's response.

Frowning, Stacy Temple turned to the little Ceutan, who thus far had remained silent. He said, "It's been my big puzzle. What did you need our exchange for? Yours is a supposedly closed economy, self-sufficient."

There was a gleam, as though of fanaticism, in the other's eye. "We need it to buy blahn from Thule."

"*Blahn*? What in the name of Sacred Mother Earth is blahn?"

The other was scornfully amused. "Nartha," he sneered. "What is nartha? Nothing. One who has experienced the pleasures of blahn cares nothing for nartha. Nothing, understand!"

Stacy was staring at him in disbelief. "Thule!" he said. "But that's another aquarium economy. Completely self-sufficient. What does she need the interplanetary exchange for?"

For a moment, the dreamlike quality of the other's eyes faded and there was a flicker of puzzlement. "You know," he said. "We've often wondered."

Ross came to his feet, looking at his watch. "And that's my unfinished business," he said. "Gentlemen, you'll pardon me." He looked at Stacy. "Surely you can handle your own affairs from here on." His mouth twisted sourly. "Both politically and romantically." ■

● I would look at the Earth's horizon and see the Earth's atmosphere. It is very beautiful. It is blue and white, gold and orange. And it is so thin and fragile. That atmosphere is all that keeps Earth habitable, but it's no thicker than the skin on an orange—no, thinner than that, like the skin on an apple. There's no way to explain how clearly you can see the fragility of the Earth. You have to have been there.

GERRY CARR (Member of Skylab 4 crew)

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I could smell myself and I could smell Sam clear across the hotel room. The room was damp and cold. There was no heat and there was no hot water for showers, and the laundry people would not take our clothes while it was raining, saying in Spanish they needed the sun to dry them.

Outside, the rain drizzled and dripped for the seventh day. I was sticky and smelly and going stir crazy, and it was my fault because I had booked Sam to play in a Mexican University exhibition game of ancient Aztec soccer. Sam had won everything in football; he was tops, and he knew it. What I wanted was for

THE OLMEC FOOTBALL PLAYER

Are you sure this is fiction? Take a look at the evidence....

KATHERINE MACLEAN

Katherine MacLean

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the world to know Sam Martin could be tops in any game.

I said to Sam, "The rain has to stop today. Just wait."

Sam lay on a woven stick sofa. It was too small for him and he had his big legs draped over the end. He looked bored.

"I'm waiting," he said, not moving the book on his big chest, propped up by his daddy's time machine.

I sneaked a look at the title—*Early Mexican Nations*. Sam liked books. He claimed he went into star football because it attracted more girls than a Ph.D., but he could have made it through college without the football scholarship. His eyes gleamed, and he smiled.

What was there to smile about? All the newspapers were in Spanish. I had nothing to read. The rain kept dripping. I could smell myself and Sam, and I was going crazy, losing money by the minute, while we waited. I tried positive thinking. "When it stops raining everybody will want to go to a game. The TV news will cover you, Sam. International Spot News of you playing soccer in an authentic ancient Aztec soccer field."

He looked over his book at me, tired. "When you talk that way, brother, more is coming down than just rain. I don't photograph good covered with mud, and nothing photographs good on a cloudy day. You arranged this game. You goofed, manager." He waved his middle finger at me. "You didn't check the rain tables before you booked us into this rain forest!"

I couldn't think of anything to say back, so Sam looked back at his book. He seemed to be studying the same page over and over. The crazy gleam in his eyes got brighter.

He handed me the book suddenly, reaching a thick black arm right across the room. "Good picture of me here, right?"

The whole page was filled with it, a big round carving of Sam's head in different lights with different backgrounds. It caught him in one of his sullen thoughtful moods, catching the sad downslope of his eyes at the corners and the downtilt of his big relaxed Bantu mouth when he was thinking. Under the pictures it said "Olmec Heads."

"Who's Olmec?" I asked. "He did a nice portrait of you, Sam."

Sam didn't laugh. "Olmec was a tribe of Indians, dummy. They lived around here, easy and comfortable, no human sacrifices. They built little cities before the Toltecs built big cities. They had a funny style of vases like sculptures and they left a lot of big round stone heads all along this coast. One of the heads is ten feet high. Nobody knows why they carved all those big heads. All of them have my face."

I remembered seeing postcards of big stone heads, but I had never looked at

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the faces very closely before.

"Just somebody else like you, Sam," I said. But my hair was trying to stand up because I could hear in the tone of his voice he meant it had been himself with the Olmecs back centuries ago. I was afraid Sam was freaking out.

"You blind?" he asked, still pleasant. But I did not want to be in the same place with him if he was going crazy.

I tried to talk him out of it. "That's not you Sam. He has—" I peered at the picture, looking for a difference. "He has bags under his eyes and a scar on his cheekbone." But I was lying. I'd seen Sam after a hard time on the football field, and after staying up all night with girls. This face looked like both at once, but still Sam's face.

Sam made a grunt of disgust at me, rolled to his feet, and padded to the cooler to get a bottle of beer. He was so big he made the ceiling look low. He said, "If you too blind to see, try to think. What's a black football player doing in Indian country twenty centuries back? That's no Indian chief, right?"

I didn't have anything to say back that was smart, so he kept on talking. "I'll tell you what he's doing. He's bigger than they are, and he's winning all their games. And he's out in the nice dry sun every day, and under the moon at nice long beach parties every night." Sam upended the bottle of cold beer and drank half of it in one long glug, then lowered it and sighed. "And all the old mama-fans are sending their daughters over to try to get some of that size and muscle and brain into the family. And that black football player, he's getting bags under his eyes trying to help them all out." He drank the rest of the beer.

Still smiling, he picked up the little time machine his daddy had left him and pulled on it. It stretched out like a tripod and opened up like a beach chair into a big frame.

I was scared. "Hey man, don't frig with that thing! Remember when I tried it?" I had only used it a little, just to send back notes to myself when I lost bets on the world series, to tell me who I should have bet on. It was nothing bad I did, but right away the walls had started to rock like an earthquake, and puking had done no good, it had all kept on rippling. Sam had come in and found me on the floor.

He'd told me I was lucky I hadn't split myself in half. He said I had committed a paradox, worse than a short circuit. Now I tried to warn *him*. "Sam, look out, don't—" but I had forgotten the word. I didn't want my best football player puking and hanging onto the floor for a week, like I had done. "Don't—"

Sam wasn't listening. He finished standing the frame up, then plugged its electric cord into the wall. I tried to stop him by lying. "Hey, man, you crazy? Those things are just stone idols. Not you." The rain dripped outside and I

● The heavens call to you, and circle around you, displaying to you their eternal splendours, and your eye gazes only to Earth.

DANTE

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felt sticky and spooked.

"Nice gig, being an idol," Sam said, fitting on his helmet. "Don't hype me, man. I know my own face. Those fans are waiting for me in the warm sun." He steadied the time-machine frame and looked for a way to get inside.

I remembered the word he had used on me when I had tried to send back notes and gotten sick. "I don't want you puking around here for a week like me." I grabbed his arm. "Don't make a *paradox*, man. You can't do this. It's too far back."

He pointed at the book on the coffee table open to three big stone heads of Sam Martin. "I can't make a paradox. I been there already. You gonna make a paradox if you stop me. It's a paradox if I ain't there for them sculptors to look at, right?"

I let go of his arm and froze, afraid the walls would start rocking again.

He let out a deep chuckle and squeezed inside the wire contraption. "Pass me a basketball."

He looked like King Kong in a parrot cage. I shoved a basketball in around his ankles, thinking about hot dry sun and green jungle and long sandy beaches and clean stone cities before the white men came and messed it up. Outside I could feel the dirty cities with rain dripping and the cars going by making bad smells, and the world getting smaller and more crowded. I wanted to go with Sam. But I was too scared to say so.

"You gonna have a hard time, Sam. You don't know the language," I warned, hoping he would come out of that time machine.

He grinned with a big mouthful of white teeth. "We dumb athletes don't have to say nothin', massa. We just start chucking a ball around where somebody can see us and we get a smart manager and free education and the red carpet rolling out ahead all the way to the groupies and nice sweet girls ahh, yes indeed, those sweet girls . . ."

His eyes brightened back to that wild gleam; his fingers flexed. He connected two wires and vanished.

The rain had stopped in Xalapa and the sun was drying the streets. I took a taxi over to the university campus to tell them to take Sam out of their advertising for the game.

On the way out of the office I walked over to the big stone head of Sam they have balanced on a hill in front of their Department of Anthropology. It is only six feet high from chin to helmet, and the sculptor had done a nice job, even faking the gleam in his eyes by cutting for shadows and lights.

I walked back to my hotel noticing how many of the people I passed looked like Sam. The grown ones look different because they have big square Indian jaws, but as I passed young ones, those thick curved lips, those big drooping eyes, and that sulky thoughtful expression kept looking back at me from the faces of Indian kids—like reflections of Sam. Like his children.

How come those archeology books never mention that the Olmec heads look just like a black football player?

I'm going to look around in the local museums of archeology. I don't want much, even a small clay statue of me will do, as long as it looks just like me. That time machine is still plugged in over at our hotel room. Like it's waiting for me. ■

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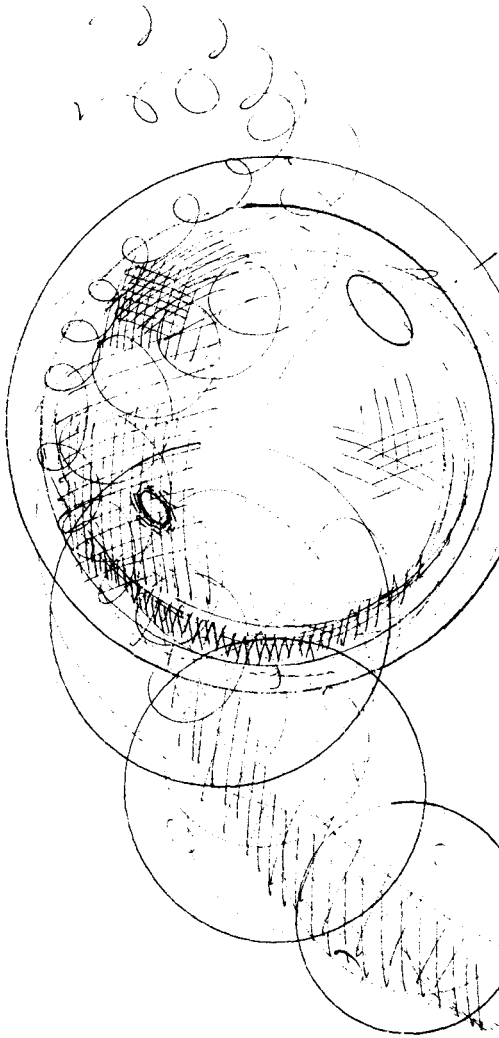


"Look at this," my partner the genius said. He was waving a soap bubble.

I looked back at the program taking shape on my terminal's screen. Orderly green lines of PL/II commands. "Lay off, Harry. I'm not interested."

Harry ignored remarks like that . . . probably didn't even hear them. He leaned over me heavily. A fat drop of soap solution splatted on the keys. I sighed, punched in a SAVE, and logged off.

"Watch," Harry said. He had one of those super-bubble frames, a big plastic ring. There was a ten-centimeter soap film stretched across it. Harry blew a gentle stream of air at the center. The big film wobbled, bulged, and then a procession of little bubbles began pinching off and floating away.

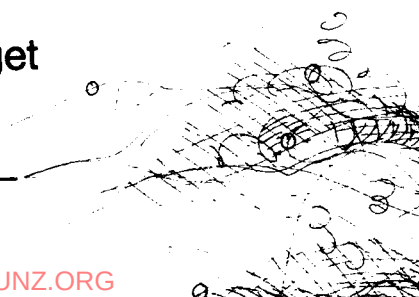
"Radioactivity, Harry," I said, trying not to nag. "Waste disposal. Remember the NRC contract?"

He stared at the dancing soap film, thick lips parted in wonder. A bubble landed on the film and merged back in.

Someone was shouting in the reception room. Someone from New Jersey. Rosie's footsteps came stitching down the hall. I walked past Harry and leaned out the door. "What's up?"

FARAWAY EYES

Dedication is nice, but some people do get *too* wrapped up in their work.



RUDY RUCKER

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Rosie wore her hair over her face with a transparent peep-hole dyed in. Her dress was hologrammed to look like a tree-trunk. A nice girl. Sometimes I wondered what she looked like.

"There's a man with a wheelbarrow to see you, Mr. Fletcher. A Mr. Kreementz?"

I remembered Kreementz. He was in charge of pollution control at Murden Chemical in Newark. Harry and I had built him a novel stack-scrubber about five years ago. There'd been no complaints before this.

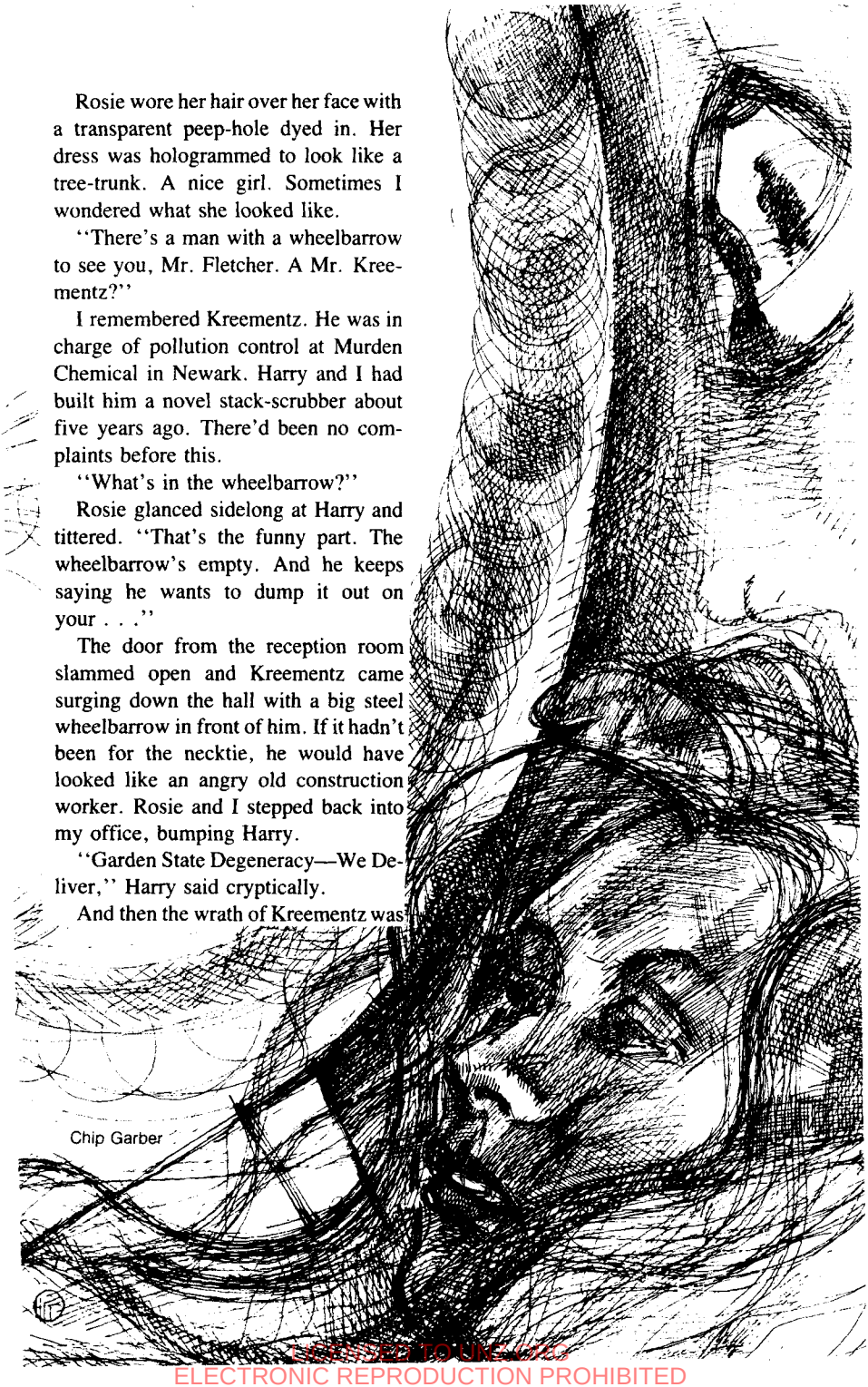
"What's in the wheelbarrow?"

Rosie glanced sidelong at Harry and tittered. "That's the funny part. The wheelbarrow's empty. And he keeps saying he wants to dump it out on your . . ."

The door from the reception room slammed open and Kreementz came surging down the hall with a big steel wheelbarrow in front of him. If it hadn't been for the necktie, he would have looked like an angry old construction worker. Rosie and I stepped back into my office, bumping Harry.

"Garden State Degeneracy—We Deliver," Harry said cryptically.

And then the wrath of Kreementz was



Chip Garber

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upon us. "The jig is up, boys. I filed suit on my way over. You know what a plant shut-down costs per *hour?* You ain't gonna sneak off and leave *me* holding the bag."

He set the wheelbarrow down heavily. His suit was sweat-stained, and he was breathing hard. I wondered how an empty wheelbarrow could be so heavy.

"Sit down, Mr. Kreementz." I gestured at my chair. "I don't know why you think Fletcher & Co. would do anything other than stand behind our products. If Murden Chemical has a problem with our emission controller, I can assure you that . . ."

Harry had been staring at Kreementz in that fishy way he had. He made sure he had Rosie's attention and then he stuck his thumb out from his fist and mimed someone drinking out of a bottle. I was surprised to see him joke that way. Kreementz caught the gesture and flared up.

"That weirdo null-ray of yours is on the fritz. Every time we start it, it shuts itself off again. And they're blaming me!" He glared at Harry. "You'd drink, too! You think it's funny? Try this on for size!"

With a grunt he tipped the wheelbarrow forward. Something too small to see thudded onto the concrete floor. Dust and stone chips flew up. There was a terrible rumbling, like a lead beer-barrel. It was rolling towards Harry.

With a heavy man's nimbleness, Harry stepped to the side and knelt down. There was a slowly lengthening groove in the floor. There was something at the end of the groove, something tiny that rolled and rumbled.

Rosie was standing by the door looking like a hairy fencepost. When her peep-hole didn't show, you couldn't tell which way she was facing. I assumed she was watching Harry. He seemed to fascinate her.

"Very nice," Harry said as he inched along the floor on his hands and knees. "Come take a look, Fletch."

I glanced inquiringly at Kreementz. "Be my guest," he said. "We've got plenty more where that came from. The base of Stack Seven. That's the one that you . . ."

Suddenly I got the picture.

The rumbling was still going on. It sounded for all the world like Kreementz had started a heavy little ball rolling across our floor. I got down next to Harry and squinted.

It was tiny, a fraction of a millimeter across. A little sphere, shiny like a droplet of mercury. Judging from the groove it was chewing into the floor, I guessed it weighed well over a hundred kilograms. Harry planted his thick thumb in the ball's path. The ball rumbled under his thumb without slowing down. Pretty soon it would hit the wall.

Rosie was behind me, leaning over to see too. I shot a look up. With her hair hanging forward, I could see her face. She had a prim mouth and faraway eyes. When she saw me looking at her she stood up straight.

I got up, determined to show Kreementz who was boss. "Mr. Kreementz, the null-ray was designed to compress the matter inside your stack. We did *not* say that the matter would then disappear. I believe I warned you to keep the stack clean."

"But I didn't see anything building up!" Kreementz burst out. "The first

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month I cleaned it out every day, but one day I missed and the gunk was gone anyway. I figured that ray of yours would make anything disappear if it stayed in long enough."

"In other words, you haven't cleaned the stack for almost five years of continuous operation?"

Kreementz started to nod, then glared. He'd admitted too much already.

"I guess you were right," Harry said to me as he stood up.

"About the automatic shut-off?"

"You mean you *designed* the null-ray to stop working?" Kreementz demanded angrily.

There was a sudden crunching. The little ball was drilling through our wall and into the next room. When the noise died down again I answered.

"We wanted it to be . . . fool-proof."

"You see," Harry added, "if you leave something under the null-ray long enough . . . say five years . . . then it goes black hole."

Kreementz mopped his brow. "What would have happened if we'd gotten a black hole in Stack Seven?"

"I'll give you the good news first," Harry said, his ropy lips twisting in a smile. "Quantum effects would force the hole to evaporate into pure energy. By measuring the energy released in the evaporation event, scientists would be able to tell whether or not the quark theory of matter is completely correct. Fletch, give him the bad news."

"According to Stephen Hawking's calculations, the 'evaporation' of a hundred kilogram black hole would be the same as a ten-megaton nuclear blast. Of course, if quarks are not truly fundamental, then the blast could be some ten thousand times stronger."

"You guys would have been great on *Laugh-In*," Kreementz said sourly.

"What's *Laugh-In*?" Rosie asked.

"It was a T.V. show when Mr. Kreementz was little," I said. "He seems like a person who watched television a lot as a child, doesn't he?"

"At least I *had* a childhood," Kreementz retorted. "You guys look like you was hatched. Especially him!"

Harry was staring at the wall, shoulders hunched and fists thrust into the enormous pockets of his baggy gray polyester pants. There was a muffled crash as the little ball left the next room.

Harry turned slowly to Kreementz. "How many tons?"

"He means how many tons are in the stack," I explained.

"I ain't weighed it," Kreementz said sullenly. "Five years worth of smoke. Maybe two hundred thousand tons."

"But smoke is light," Rosie protested confusedly.

"Not at Murden Chemical," I said.

"Not when these guys are through with it," Kreementz added. "They built us a ray which kills all the atoms inside Stack Seven. They stop vibrating and shrivel up. We have a cap on the stack. Every few minutes it gets as full of smoke as it can hold, and then the null-ray triggers, and everything inside the smokestack disappears."

"You keep forgetting that the stuff doesn't disappear," I corrected. "It just collapses down to a very small size."

"Like a trash compactor?" Rosie suggested meekly.

I nodded. "That's what we had in mind. One smokestack full of crud was supposed to make a hundred kilogram

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block the size of a brick. But Mr. Kreementz left the stuff in there to get collapsed a little more with each pulse of the null-ray. We warned him not to do that, but he did it anyway. If I hadn't put in a mass detector coupled to a shut-off circuit, then Mr. Kreementz would have turned Central Jersey into just another beautiful memory."

The rumbling had stopped after the last crash. The shiny little speck of degenerate matter had probably sunk into our flower bed. "How dense *is* that stuff?" I asked Harry.

He had been scribbling on the blackboard ever since Kreementz had given him the two-hundred-thousand tons figure. "I get ten-to-the-eleventh grams per cubic centimeter. That's neutronium. Plain neutrons with just enough degenerate electrons and protons mixed in to keep it stable. Frankly, I'm surprised it worked."

"Is neutronium valuable?" Kreementz wanted to know.

Harry opened his mouth to answer. I stepped in front of him. I had a policy of never letting Harry answer any questions relating to money.

"Are you kidding?" I asked Kreementz with a mocking laugh. "Is sewage valuable? Do people like cancer? Are oil-spills good for fish? Is the Pope Jewish? You've got a big, dirty clean-up ahead of you, Kreementz. One false move and you'll blow the plant sky-high. I don't envy you." One hand was behind my back, making shooing gestures at Harry.

Kreementz sighed heavily. "You wouldn't have a drink handy by any chance, would you?"

Rosie got him a Coke and a few ounces of lab alcohol. He took a long, thirsty pull. Deftly I set the hook. "We *could* organize the clean-up, but it'd be . . ."

"No, Fletch," Harry said. "It's too dangerous. I don't think we should risk it." He was right on the beam.

"I've been authorized to make you an offer," Kreementz said, naming a reasonable sum. "It's a lot to pay, and I still think we could win the lawsuit . . . but the management wants to get her started up again."

"Triple that and we'll have it clean in two days."

"Double."

"Done."

Actually, the clean-up was a piece of cake. We opened up the side of the smokestack and brought in bulldozers. The stuff on top was something like high-grade iron ore. The lower layers had been under the null-ray longer. We had to truck most of it out a few cubic centimeters at a time. Our trucks could only carry a hundred tons. But we'd rented a fleet of them.

Harry had poured a titaniplast floor into our basement. The stuff was a compound based on the new quark chemistry. No one knew yet how strong it was since no one had ever been able to break a piece of it after it hardened.

We dumped the neutronium in the basement window. Harry was happy to have the stuff, said it had arrived just when we needed it. He took some waldoes down there and got to work. I was happy to get him and his soap bubbles out of my office.

My job right then was to run some computer simulations for the nuclear

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energy people. How many would die if we buried the radioactive waste in a diamond mine. What would happen if you put it in the polar ice-cap. How much would it cost to rocket it into the sun. They'd been stockpiling the waste for forty years now. Every time it looked like they'd decided on a solution, someone came up with a new "but what if." Fletcher & Co. had taken an NRC contract to improve the simulations and, by God, make a decision.

Harry had promised to try and think of a brand-new solution, but I wasn't counting on it. I just concentrated on debugging my programs. The extra money from Murden Chemical had helped, but if I couldn't make the NRC happy enough to pay big bucks, then the leaser was going to repossess my central processing unit. I would have sooner given up my own medulla.

A week went by. Rosie brought me my lunch as usual, milk and tuna-salad sandwich. I didn't like to stop programming when I was hot. But instead of quietly leaving, Rosie stayed standing next to me. Today's dress was hologrammed to make a fountain out of her. It was distracting.

"Is there a problem, Rosie?"

"It's Dr. Gerber. He's been acting strangely."

"When Harry *stops* acting strangely, I'll worry. Meanwhile, could you get me some more milk?"

I went on eating and punching keys for a while, but then I realized she was still standing at my elbow. "All right," I said, finally looking up. "Tell me about it."

"I guess you know that Dr. Gerber and I are . . . are . . ."

I hadn't. The possibility had never occured to me. *Harry? Rosie?* They were my genius and my receptionist. It was hard for me to think of them as being anything else.

"I didn't feel it was my place to interfere," I said finally.

"He moved in with me two months ago," she said with a toss of her head. For a second I glimpsed her aquiline nose. "I've been after him to take me somewhere, somewhere far away. But now he hasn't come home for a week. He just stays in the basement here and he won't come out."

So, I wanted to say, that's what he *always* does when he's onto something. Leave him alone! Instead I said, "Perhaps I'd better have a look." I stood up and headed for the door.

"And tell him that I'll stop nagging him about the trip if he comes back," Rosie added.

Harry didn't notice me at first. He was asleep. The basement looked like a minimalist sculptor's studio. The main exhibit was a bowed ramp of titaniplast that seemed to have grown out of the floor. The ramp slanted down from one wall, and then swooped back up to the other wall. The ramp had a semi-circular groove on top, and at the low point there was black titaniplast sphere. The set-up reminded me of the ball-return gutter in some unearthly bowling alley. The ball was one-and-a-half meters across and looked heavy.

I walked past the greasy vinyl couch that Harry was lying on and looked at the sphere. The utterly rigid black material shone dully under the yellow electric lights. There was a hole cut in one side, a pentagonal hole big enough to

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crawl through. There was something funny about the space inside. It was like staring into a lens.

As I leaned closer I felt an unpleasant pressure on my temples. I straightened up, but the sphere kept getting closer. I was sliding across the floor. I jerked in fear and fell backwards. Crablike, I scuttled back across the room.

"The only way to get in is fast," Harry said from behind me. "It's not so bad inside, I think. Positive curvature instead of negative."

I sat up and looked around. Harry was lying on his back with his arms and legs sticking straight up. It must have been exercise, but it looked terrible.

"Rosie sent me," I said, before I forgot why I'd come.

"Why?"

"She wonders why you haven't come to see her this week."

"I've been busy."

I decided I'd done enough for Rosie. "What's the sphere for?"

"You roll it back and forth. It's a dodecahedral skeleton of neutronium bars embedded in a shell of titaniplast. A padded jungle gym for gravitons. What else did Rosie say?"

"She said that if you came back she'd stop nagging you about the trip. What happens when you roll the sphere back and forth?"

"I hoped she'd say that. I hate travel. I ought to go up and talk to her . . ."

He started out, but I caught him by the shoulder. "Harry, please tell me what you've built here."

He looked at me, baffled. "Can't you see?"

"I see a hollow black sphere sitting on a rocker track. Why don't we take it from there?" I suggested demurely.

"You remember my super-bubble ring? This is sort of the same thing. It's to get rid of nuclear waste. Anything that's inside the sphere disappears when the sphere rolls back and forth."

My heart skipped a beat. "Have you tested it?"

"No. Wait a minute. I'm going to get Rosie." He flicked on a switch and went upstairs.

While he was gone I looked the thing over some more. Harry had started a system of winches and pulleys running. Almost imperceptibly, the sphere was creeping up the ramp. I hoped it didn't fall off. That degenerate matter packed a wallop. I sat down on the couch and started mentally drafting my letter to the NRC. All things considered, a half billion a year didn't seem like too much to ask.

When Harry and Rosie finally came down I could see that hunky was still far from dory. Harry didn't understand about apologies, about white lies. I wondered what she saw in him.

With both of us there to impress, Harry became more communicative. His soap solution and super-bubble ring were under the couch, and he dragged them out. He made a big film and blew at the center of it. The film wobbled and bulged.

"That's what space is like inside a massive object," Harry said. "It bulges towards the fourth dimension. Now, if I blow harder . . ."

He did, and a little bubble pinched off the film and floated away. "That's the way a black hole does it. But we can't use them. So instead . . ."

He blew out a little bulge in the soap

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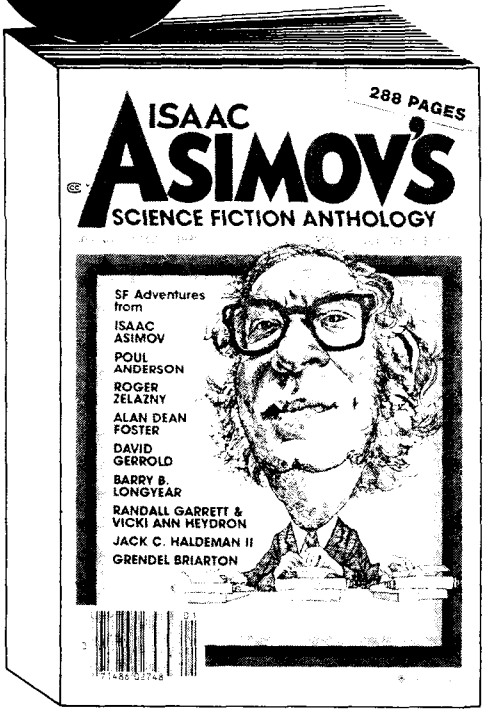

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film again. But this time instead of blowing harder, he jiggled the film back and forth. Ripples darted around on the film's surface, and suddenly two of them happened to meet near the bulge. The film shuddered, a little bubble floated off again.

"That's what the neutronium skeleton is supposed to do for us. The space inside it bulges way out towards the fourth dimension. And when the sphere starts rolling down the ramp those moving bars of neutronium are going to churn up space waves like a mix-master. Sooner or later two waves will meet, and the bulge inside the sphere will pinch off to make a little hypersphere outside of our space."

The winch motors turned off with a click. The sphere was poised at the top of the ramp.

"What happens then?" Rosie asked.

"The hypersphere floats away. Maybe it lands on a different space, maybe it comes back to ours someplace else."

"Another space . . ." Rosie said slowly. "Like the astral plane?"

Harry shrugged. "If you want to call it that."

The sphere had come to rest at the top of the track with the hole on the side pointing towards us. Harry had a little loading chute ready by the track there. It was aimed so that anything that slid down it would zip right through the hole in the sphere.

"What do you want to put in?" Harry asked.

"Would it . . . would it be dangerous for a person?" Rosie wanted to know.

"What a question!" I burst out. "You'd be squeezed to death! And then the gravity waves would work you over. And if by some wild fluke you lived through all that, where do you think you'd end up? Even if your space bubble ever did join up with a normal space again, what do you think the odds are that you'd land on the surface of an Earthlike planet?"

"Maybe it would take you to a different *kind* of space," Rosie suggested mildly. "Where you don't *need* planets."

"Rosie will always have the mind of a secretary," Harry said cuttingly. "What do you say I put this in?" He picked up an empty cardboard box from the floor.

"Fine," I said. "But then let's try something massive, too. A sandbag."

Harry set the cardboard box at the top of the little sliding-board and let it go. The sphere's field accelerated the box down the chute and it zoomed through the hole, getting somewhat crushed by tidal forces on the way.

Once inside, it bounced around for a minute before settling to the bottom. The bouncing had fluffed it back up again. Except for all the box's right angles being a little too big, it looked fine.

"Why doesn't the gravitational field in there crush it?"

"Anything inside is pushed and pulled in every direction at once," Harry said. "Which adds up to nothing. Of course there's still a strong positive curvature of space in there. And when those bars start moving around . . . But I don't want to bore Rosie." He shot her a nasty look, but she just stood there, stiff and alone.

Harry and I went upstairs then to get one of the sandbags from the radiation lab. It was a good fifty kilos, and it took

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the two of us to get it down the stairs. Neither one of us is getting any younger.

Rosie was gone when we got back downstairs. "You shouldn't have said that about the mind of a secretary."

He sighed. "Ah, she's always talking about that fantasyland stuff. If only I could get her to take a night school physics course. There's wonder enough in pure science without going in for a lot of malarkey. And she *still* won't give up on that trip business."

We heaved the sandbag onto the chute and it slid down to rest by the cardboard box. Then Harry tossed a cap-shaped titaniplast hatch-cover in place. The gravitational field slammed it on tight. We stood clear and he tripped the release.

The enormously heavy sphere rumbled down the incline, past the middle and back up the other wall. Then it came back. I thought of a bubble wand waving back and forth. I could feel the gravity waves in the pit of my stomach.

"It's not moving very fast, Harry."

"Doesn't have to. The dodecahedral field configuration is inherently unstable, especially with that space mixmaster going. I bet it's pinched off five hyperspheres by now. Hear the air rushing in?"

Indeed there was a hissing to be heard over the rumble of the track. As the space inside the neutronium sphere was blown away, new space and new air had to seep in. I actually felt myself drawn towards the sphere again, but this time from across the room.

It took about ten minutes for the oscillations to damp, for the sphere to stop rolling back and forth. When we slid the hatch-door over with a long stick there was nothing inside.

"We ought to send a radio beacon through next time," Harry remarked. "Then we could hear if it resurfaced somewhere in our space."

"Tomorrow," I said. "Right now I want to celebrate. What do you say I take you and Rosie out for the best meal of your lives?"

But we couldn't find Rosie anywhere. In fact, she never showed up at the office again.

It's funny a girl like that. I never noticed her much when she worked for me, but now . . . now I dream about her every night. So does Harry. ■

THE 1980 NEBULAS

On April 26, the Science Fiction Writers of America met in Beverly Hills, California, to make their annual Nebula awards for the best science fiction stories of 1979. Congratulations are in order for Edward Bryant, who received the award for Best Short Story for "giANTS," which appeared in our August issue. Other Analog stories which appeared on the final ballot were John Varley's novel *Titan* and Joan Vinge's novella "Fireship."

The award for best novella went to Barry B. Longyear for "Enemy Mine," published in our "sibling magazine," Isaac Asimov's Science Fiction Magazine. Best novelette was "Sandkings," an Omni story by frequent Analog contributor George R. R. Martin. Best novel was *The Fountains of Paradise*, by Arthur C. Clarke.

Our congratulations to all the winners and nominees.

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CORLEY

Planning is necessary to colonize a world. But not necessarily sufficient....

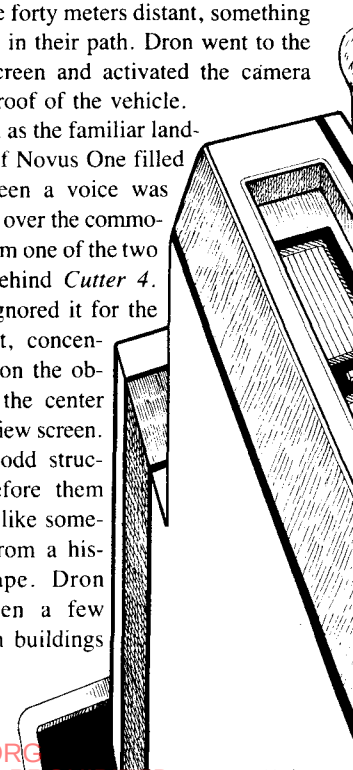
GARY ALAN RUSE

Dron Gordon stared absently at the controls of *Cutter 4*, looking at but not seeing the scanner readouts that gave mute warning of the problem ahead. Had his mind been on his work instead of on the aggravating matter of his job's monotonous daily routine, he would have seen the obstacle before the robots were required to act.

Shut-down indicators flashed and sounded as the treads of *Cutter 4* ground to a halt, bringing the massive six-hundred-ton vehicle to a carefully controlled stop. Power to the forward cutter beams ceased an instant later, and the vehicle sat motionless at the end of a perfectly formed channel that stretched back to the distant horizon—a channel exactly as deep as the vehicle was high, and only slightly wider.

Dron Gordon turned to face the metallic figures at the navigation console, his gaze held by their staring, expressionless photo-sensors. He would have preferred a completely automated system to the presence of humanoid operational and maintenance robots, but the same design engineers who had built the channel trains in three sections had decided on independent robot units that could be repaired or replaced without sidelining a complete vehicle. They could communicate verbally, but Dron hated the sound of their artificial voices.

He instead turned back to the scanner readouts and saw what he should have seen in the first place—a ground-level obstacle forty meters distant, something directly in their path. Dron went to the view screen and activated the camera on the roof of the vehicle.



Even as the familiar landscape of Novus One filled the screen a voice was coming over the commo-link from one of the two units behind *Cutter 4*. Dron ignored it for the moment, concentrating on the object in the center of the view screen.

The odd structure before them looked like something from a history tape. Dron had seen a few wooden buildings

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before, on the outskirts of Colony Base Prime, but never anything like this—a small two-story structure with a high peaked roof and a wide porch along the front, trimmed with simple wood ornamentation. Other archaic terms came to mind, things like "gables," "bay windows," and "cupolas."

Dron was puzzled as much by its appearance as by its location. Taking his eyes off the image, he grabbed the area chart and studied it with fuming regard.

The voice on the commo-link repeated, "What's going on, I said! Dron? Why the shut-down . . . did you blow a reactor?"

Eyes still on the chart, he leaned closer to the commo-link unit in the wall. "Something's in the way . . . just ahead." He paused a moment. "I'm going out to take a look."

Folding the chart, he took it with him as he climbed the ladder to the roof. The air outside felt warm and slightly humid after the conditioned atmosphere of the cutter. Slight traces of steam were rising along the sides of the cutter where the fused, rock-hard walls of the channel still glowed from the heat of the beams that formed them.

To the rear, the poly-surfacing unit was just coming to a halt at a safe distance, and behind that, where the channel's walls became smooth white plastic receding into the distant horizon, the third unit was stopping. Along the tubular guide rails put down by the third unit, maintenance cars would soon be traveling to install the necessary equipment and countless miles of wiring. Soon . . . but that was yet to be, and this delay would not help matters.

Dron walked to the edge of the sixteen-meter-wide vehicle and jumped across the gap between it and the channel wall. Once on the firm soil, he headed for the wooden structure.

Drawing close, he could see the figure of a man sitting on the front porch. The man was still and silent, his white hair glistening bright against the off-white of the painted wood behind him. His tanned and weathered face looked a part of Novus One's landscape.

Dron approached him, stopping a short distance away. "How long have you been here?"

The old man's eyes were not on Dron Gordon. They studiously scanned the imposing hulk of *Cutter 4*. "You know," he said abruptly, "I reckon you could just cut right on through my place with that machine of yours and you'd hardly even know it."

Dron grew impatient. "I said, how long have you *been* here?"

The old man's eyes swung around on him. "A lot longer than *you*, that's for sure! I built this old house of Cassa wood, and that takes a dozen or so years just to season properly."

Dron shook his head and unfolded his chart. He stood staring at it for a long moment. The whole of the Eastern Continent was covered with grid lines like sections of a geodesic dome, and his own portion of the channel system had been marked in red. "I don't understand. Our figures must be correct."

"I'm sure they are."

Dron looked up again. "The Planning Center should have contacted you about the path of the channel in this area."

The man pouted agreeably. "I'm sure they did."

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"Then why are you still here?"

"This is my home."

Dron frowned. "But you can't stay in this exact spot."

"Why not?"

"Because . . ." He hesitated, then asked, "What's your name?"

"Corley. Corley Jennings."

Dron wrote it down on the edge of the chart, then turned abruptly and headed back to the cutter. Stepping off the ladder inside, he walked to the commo-link unit. The sound of his footsteps drew a response from one of the other vehicles.

"What is it?"

"I've got to call the work base," Dron answered. "It looks like a legal problem."

"Legal?" the voice replied. "Sounds like a big delay."

Dron tapped the switching cell on his wall unit and got the operations frequency at their work base. When the on-duty coordinator replied, he explained the situation.

"We've got a problem here. Civil. Looks like we'll need some clarification from someone." He checked his time bank. "It's almost the end of the work period. You'd better send the shuttle to pick us up."

A mist of dust particles clouded the air briefly as the air shuttle touched down on the poly-surfaced landing pad. Capable of holding ten passengers with ease, the shuttle held only the three-man channel crew. Ordinarily, the second shift would have gone out on the same flight that picked up Dron and the others but, with the work schedule temporarily halted, there was no need. The robot crew of the channel train units had been powered down but could reactivate in case of emergency.

Cam Lin, technician from the third unit of the channel train, disembarked behind Dron, brushing the settling dust from his uniform and glaring woefully at the raw ground to the west. Several pieces of heavy equipment lumbered across the area, reforming the ground to serve as a base for new, permanent facilities.

"I'll be glad when they start construction," Cam grated, still brushing as the last of the dust stirred up by the shuttle's landing settled to the ground. "This whole area is beginning to look like an ore-processing settlement!"

"Give it a week," the third man said. "It'll be worse."

The third man was Zaba, technician of the channel train's second unit. Zaba's skill at his job was more than adequate, but Dron had always considered the man's intellect more reactive than imaginative.

"That work site's going to be one big mess," Zaba said, "until they get it hardened and surfaced." As an afterthought, he added, "And seeing all that dust can make a man thirsty."

With that, he headed in the direction of the technician's lounge. Cam Lin smiled wryly and followed, leaving Dron to make the report to Abbot.

The operations headquarters was a pre-fab structure, built like a wide A-frame with the large corrugations in the material running vertically. A framework of clear plastic sheeting enclosed the ends, allowing an abundance of natural lighting during the day. A thick spray-on coating on the interior of the

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A-frame served both as heat and sound insulation, and as a light-softening finish for the slanting walls.

Everything looked temporary. Desks and chairs, mapping tables and survey equipment—all were chipped and worn around the edges from having been transported from one location to another. A partition divided the floor space roughly in two, and in its center was the door leading to the Chief Engineer's realm.

Dron headed for it, glancing as usual at the poster that had been on that partition for as long as he could remember. Now faded and grimy, it still proclaimed, TEAMWORK TO BUILD A NEW WORLD.

Abbot was bent over the huge plotting table in the center of an area that looked more like the war room of some ancient national military force than the engineering facility it was. Dron stopped a short distance away and waited for his superior to finish marking a coordinate on the glowing surface.

Abbot looked up finally, removed the remote headset through which he had been receiving progress data, and stuffed the compact unit in his pocket. "Have you got the exact coordinates where you shut down?"

"Right here," Dron replied, showing him the figures marked on the plasti-coated chart. He reached for his log book. "I can give you the power-usage data, and the readouts on the—"

"Later," Abbot interrupted. The map he had been using disappeared from the upper surface of the plotting table as he called forth a new one from the computer banks. Another full-color image appeared and Abbot compared it briefly with the chart showing Dron's position.

"The topping crew is about twenty miles behind your position," Abbot said. He was a short man of sturdy build, whose features were seldom anything but grim. "By the end of tomorrow, *they'll* have to shut down as well."

Dron looked displeased, as much for Abbot's benefit as his own. "We're a little ahead of schedule. That helps—"

"Sure . . . It helps. But I'd rather lose as little as possible of that surplus." Abbot pointed back toward the map. "Besides, once the topping crew stops sealing the roof of the channel, the equipment and cable men behind them will have to stop when *they* catch up. Then the finishing crew behind them. Pretty soon the whole damn thing's backed up!"

Dron stared at the pulsing dot of light that represented *Cutter 4* and, not far from it, Corley's house. "Will we need a Civil Rep to handle things?"

"Yes, unfortunately." Abbot's mouth twisted in displeasure. "I've already notified Master Planning headquarters at Colony Base Prime. They should have a man out tomorrow."

"Then maybe we'll be able to pick up with the second shift."

"We'd better." Abbot sighed and turned off the plotting table's switching cell with a swat of his hand. "I didn't need this right now. We just got the other channels on schedule and were getting ready for the move next month."

Abbot walked over to a facsimile unit labeled "Satellite" and picked up a folded section of print-out sheet lying on the unit's front shelf. Returning, he spread it out over the corner of the plotting table.

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"Survey Three has been mapping the next sector. I've marked the route for the new channels on this one—see, in this area here is some fairly dense growth. We may have to flatten a swath through that section before we send in the cutter."

"Could be. I'll be interested in seeing the geological report." Dron took a step toward the door. "But that's still quite a way ahead of us. What's the status on the crews now?"

"All crews are off duty until second shift tomorrow at least . . . maybe longer if there's any foul-up. Make sure you check in with the coordinator." Abbot refolded the print-out sheet. "See you the day after tomorrow."

Dron left the operations building, glad that he was through for the day, but dimly aware that something still troubled him. At any rate, he could leave his job problems behind him for a while. He would not have to be concerned with the matter of Corley Jennings. He *should* not have to be concerned. . . .

On the way to the technicians' lounge, he noticed that *Cutter 6* and its brother craft were in the yard, being readied for another channel route. He envied them their change of direction.

Dron took the large shuttle back to Colony Base Prime, arriving there in a little over half an hour. From the main landing port over to his own section of the great circle of residential buildings that ringed the Base took another twenty minutes by monorail. Upon reaching level twenty of his building, he emerged from the lift and headed down the corridor to his dwelling.

His wife, Elena, was arranging cut flowers when he entered the main compartment. She looked at him with mild surprise. "You're back early. Dinner's not even here. What happened?"

Dron folded his work jacket and laid it across one end of the multi-person seating unit. "There's been a temporary shut-down. There was no chance of resuming during our shift, so I had our crew shuttled back."

She changed the position of several triangular blue flowers. "Is it a tech problem?"

"I almost wish it was. Some retired independent has built himself a house out in the wilderness, right in the middle of our channel route."

Elena looked at him oddly. "In the wilderness?"

"Yes. An old fellow named Corley Jennings. Master Planning was notified."

"He probably belongs in a care center."

"Probably."

Elena finally seemed satisfied with her flower arrangement. She left it and went to the compartment's viewer controls. "It's almost time for the Evening Progress Report. Maybe there'll be something about the shut-down."

"I doubt it." Dron saw the light flash on the wall food delivery unit and withdrew their meals from behind the panel. He was glad the transport system from the kitchen in the building's ground level was again working correctly. For almost a week, he and his wife had been getting meals destined for the couple two floors above them. "Maybe tomorrow. They probably won't report it until then."

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His wife looked disappointed. "How long will you be off duty?"

"A day, at least. That's Abbot's estimate."

"Well, that's not so bad." She came to join him at the table as he removed the thermal covering from the trays. "No one will think you a work-dodger for missing a day." As she poured their water from the table carafe, she added, "Maybe the Morning Progress Report will mention the problem."

Dron began eating, with little interest. "Have you given any thought to what I said about moving?"

"Yes," she replied, glancing at him reluctantly. "I know it's necessary, but still . . . we have friends here, and my job at the Education Center—"

"Many of our friends are moving. The others on my crew have already moved their families. It *is* necessary," he said gently. "When we begin the channel cuts in the next sector, shuttle time from here to the work site will be too long. And as for your job, the same position may be open there. We can apply—"

"It's not just the job and our friends," she interrupted. "It's . . . it's also having to move to new compartments, in a new city. This has been our home."

Dron laid down his eating utensil. "Reba City was built on the same plan as Colony Base Prime," he reminded her. "The compartments will be the same. Everything will be the same." He paused. "I could ask for a transfer to another department, to stay in this area, but the Planners have made the completion of the channel system top priority."

Elena's mouth tightened briefly, then she shrugged, sighing. "You're right, of course. It's foolish of me to resist something necessary for the progress of the colony. No, worse than foolish, it's selfish. I can make the moving arrangements by next week."

She returned her attention to her meal, seemingly without further troubling thoughts on the matter. Dron finished his meal in silence, glad that it was resolved, but somehow sorry that it had been so easy to persuade her.

The Evening Progress Report, as Dron had thought, mentioned nothing of the day's incident. It was followed by the nightly Technicians Panel and, after that, the Abstract Theater. Halfway through the last presentation, Dron lost interest in the program and left the main compartment.

In the small, nearly empty compartment next to their sleeping area, he activated the main library link and sat down before the tiny console. He selected a title from the list on the screen and the computer summoned it from its files.

Dron had read many of the ancient literary classics, even if he had not understood them. For how could there be sense in their content, in their conflicts? Though he sought hard to identify with them, his efforts were blocked by the bizarre backgrounds of the stories. The plots of all were based on premises of crime, or war between nations, or politics, or matters of social injustice.

Novus One had no nations, only a lone colony. What government there was, if Master Planning could be called that, was purely functional and apolitical. There was no apparent social in-

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justice. And with everyone busily engaged in the all-consuming task of building, the only thing approaching crime was an occasional personal dispute that was quickly settled by the Civil Reps. No, try as he might to gain insight from the old stories, for Dron the past was still a barbaric mystery forever unreconcilable with the existence he knew.

After awhile, he gave up on the selection and turned off the library link. He walked to the end of the room and slid back the clear panel that opened onto the small balcony behind this room and their sleeping area. He stood there, feeling the darkness that had fallen, and breathing in the nearness of the jungle beyond the perimeter of Colony Base Prime. The ground that separated the settlement from the abundant growth was still scarred with the color of the beams that had formed the great clearing thirty years ago. But even that was part of it. All was as it should be. Novus One could never be an alien world to anyone born on it.

Dron did not hear his wife approach until she was beside him. Her eyes were on the heavens when she spoke.

"Look . . . *Pilgrim* is rising."

Dron gazed up into the darkness and found the large metallic speck that glowed brighter than the stars. Its aspect always held magic.

"Our parents knew that as home," Dron replied tonelessly. "For years before they ever saw this world. *They* made the transition. They weren't afraid of what lay ahead."

"I said I would arrange for the move—that we'd go to Reba City—" Elena began.

"I know, I know." Dron put his arm around her. "I'm not chastising you for anything, just thinking out loud." He fell silent, and looked again across the open expanse of land beyond.

Despite the fact that he had the opportunity to sleep late, Dron awoke at the usual time the next morning. After the morning meal, Elena had gone to work, leaving him alone in their compartments. He tried studying his current engineering briefing pamphlet, but could not keep his attention on the technical data he should be learning. With the long prospect of the day stretching out before him, he felt trapped and isolated.

Dron felt like going to the Education Center to see Elena. But a distraction from her work would be frowned upon by her supervisors, and he sensed anyway that his wife would be made uncomfortable by his presence during normal, on-duty hours, despite the fact that the shut-down on his channel route had been mentioned during the Morning Progress Report.

So there was nothing to do. And idleness was more than a sin or a crime . . . it was its own punishment.

Crossing to their personal commo unit, Dron programmed a message into its temporary bank. *Have gone to work site to check on problem—will return as soon as possible.* If his wife should call while he was out she would know where he was, and that he was doing something that at least sounded official.

It was noon by the time Dron reached the work site, flying out in a shuttle borrowed from operations headquarters on the pretense of checking out the channel train's equipment. Upon landing, he did take fifteen minutes to in-

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spect *Cutter 4* and the other hulking machines that now sat still and silent at the end of the channel. But when he had completed his routine check, he wasted no time in heading for the old man's house. Unsure of how long he might be there, he took a small commo-link remote unit with him.

Corley was there on the front porch of the bizarre old building, still in the same posture as the day before, almost as if he had been there always, unchanging. His eyes followed Dron up the walk to a spot several meters away.

Dron waited a moment for some sign of acknowledgement of his presence, other than the man's continuing benign stare. But there was none, forcing him to speak first.

"I've come to talk to you."

Corley sized him up. "Come to talk me out of my home, you mean!"

"No," Dron replied uncertainly. "That's not my responsibility."

"Oh," Corley grunted. "That's right. You being a machine jockey, you wouldn't be skilled in the finer points of finagling. Leave that to the Civil Reps."

Some of the old man's words were strange, but there was a sharpness of eye that seemed to belie any hint of clouded reason. Dron persisted. "Can we talk?"

"Sure. Why not? Can't say as I get much company out here anyway." Corley got to his feet, more quickly and more easily than Dron would have expected. "But let's go inside. It's getting pretty hot out now."

Dron stepped up onto the porch and followed him through a doorway that led directly into the past. For the interior of the main room—it could hardly be called a compartment—was a perfect recreation of a decorative style well over a century old.

Windows that slid up in wooden frames were capped with cornices and flanked by curtains of colorful material. Furniture of hand-wrought wood was more than functional in design—it was art. Hand-woven carpets with intricate designs covered much of the floor space. On the walls were several small, ornately carved shelves which held more decorative objects. Nothing anywhere in the room betrayed the look of the past.

Dron was nearly overwhelmed by the richness of detail that surrounded him. He had seen images of such things in the library's historical references, but that was a detached observation. Here he was sitting *within* such an image. It was all real, all tangible.

Corley sat in one of the chairs and watched in mild amusement as Dron surveyed the room. "Like it?"

It took a moment for him to answer. "Yes. It's quite an educational experience just being here." He did not notice the old man's wry smirk. "How—how did you ever manage to build all this?"

"I've had plenty of time. Most of the raw materials are right out there around us, and the tools that I needed I made before I left my job in the metal forming division."

Dron finally diverted his attention from his surroundings and focused on the man. "Then maybe a better question would be, *why* did you ever build this?"

"You were born on this planet, weren't you," Corley answered his rhe-

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torical question with a smile.

"Yes, of course."

"And your father?"

"Born in space, on *Pilgrim*. He was fifteen when the landing parties touched down here."

Corley nodded. "So his first world was the colonizer ship. Fifteen, you say, when he landed? Then he crossed less than a third of the distance. That was a voyage, lad—that was a voyage! Fifty-five years, one month, and seven days, orbit to orbit. Took nearly two months just to transfer everyone down to the planet's surface." He frowned quizzically. "Tell me—did the research boys ever come up with a faster-than-light drive?"

"Not yet," Dron answered absently, his mind not entirely on the question. "They're still working on it."

"Should be. They were supposed to keep working on it at both ends—here and Earth—until one group or the other solved it. Course, last I heard, communications from Earth stopped a while back, so—"

"You were born on *Earth*, weren't you—" Dron interrupted, but he already knew the answer. He had sensed it the first time he spoke with the man. "But I thought all the original starting colonists were dead."

"Probably all of them are, except me," Corley answered. "Some days, I have doubts about *me*."

"But that would make you near ninety—"

"Ninety-seven," Corley corrected. "I was twelve when I left Earth."

"Your parents were part of the colonizer crew?"

"My appointed ones, yes." Corley paused while he studied Dron's curious frown. "I was one of a dozen or so children withdrawn from orphanages for the voyage. There was a certain ratio of children needed, young enough to reach adulthood and technical competence roughly a third of the way through the flight, but old enough to be safely launched from Earth to the orbiting colonizer ship. Not all the necessary technicians had children."

"How did they pick you?"

"Said they liked what they saw in my genes, or some such nonsense. That and my general health. I didn't mind, really. I had only spent a year in the children's home, but even that was a year too much. I would have been sent there sooner than that but for my great-grandfather. I lived with him till I was ten and a half . . . till he died. He was a likable old character. I remember a lot about him. Like this house, for instance. This is really his house, you see. Exactly like it, as best I can recall."

"Then this place really means a lot more to you than just living space, doesn't it?"

"You got the picture!" Corley grinned hard. "Means considerable more. So you can see why I'm not too anxious to leave."

"But how can you manage way out here—without power, without water or food?"

Corley pointed over his shoulder. "There's a little brook out there about fifty feet back. I get all my water from that. Plenty of wild fruit and vegetables growing and, as for power—who needs it? I don't have any of those fancy gadgets you folks seem to need. If I feel like sitting up past sundown I just light

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a candle." He paused abruptly. "Would you like some fruit juice? Forgive my manners. Hospitality's a bit rusty due to lack of guests. How about a slice of melon?"

Dron shook his head politely.

"Anyway, I don't reckon you'd know what a candle is, so I've probably confused you." He rose and retrieved a wooden box from a nearby shelf. Selecting one of the stubby cylinders the box contained, he held it out to Dron. "Make 'em myself. It's a lost art, really. Nobody needs 'em anymore, so nobody makes 'em. Except me. Too bad, too! Some things are nice even if you *don't* need 'em."

Dron examined the candle and handed it back. He still had the odd feeling he had slipped back in time a few centuries. And, in a very real sense, he had.

"Look," he started, trying to regain some control over the conversation, yet knowing it was a futile effort, "why not just move your house back out of the way of the channel route—there's equipment at our work base that could be used easily enough—it wouldn't have to be but thirty meters or so—"

Corley shook his head smugly. "I can't move my root cellar. Takes time to get a good root cellar going. Besides, I like it here in this spot. Why should I have to move? Couldn't *you* just go around?"

Dron sighed in exaperation. "The channels have to be straight lines. We can't just all of a sudden put a kink in the route. Even if we *could*, the channel cutter and the other equipment can't make more than a one- or two-degree turn—they weren't designed to. The machines are just set in place at the beginning of a cut and then go straight through to the end. It's virtually automatic. Even the overseeing is partially under robot control."

"Well," the old man said, "then it looks like we got us a problem."

Dron was beginning to feel as boxed in as he had back in their compartments. "I don't know what to suggest. I'm afraid the authorities at Master Planning won't give you any choice. How can—"

He was cut short by a curt, bleeping tone from his commo-link remote unit. Hastily removing it from his pocket, Dron replied, "Gordon here."

From the work base, Abbot's voice responded. "I want you to stay in the area for awhile. The Civil Rep just left here for the shut-down site. It might be a good idea if you were present for his meeting with Jennings, as a sort of representative of Channel Engineering. Since you had to check the equipment, you have an adequate excuse for being there."

"Right," Dron replied, glancing toward Corley. "I can let you know the results when I get back."

"You can let me know *before* you get back."

"All right." Dron switched off and replaced the small unit in his pocket. He glanced again at Corley.

"So," the old man began, "you came out to check your equipment." He winked. "Fast work!"

Dron looked at him without any change of expression. "As my supervisor said, it was an adequate excuse." He paused. "I did want to talk to you . . . learn more about you."

"That's reasonable enough. Sorry, though, that you felt bothered enough

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by my presence to come here and miss out on some free time. With the work schedule the way it forever is, I don't imagine you get many days off." Corley paused to scratch his chin. "No, sir. Except for events like Landing Day and the few remaining religious holidays, which are carried out more from routine now than devotion, no one really has vacations at all. Maybe just as well too. Most people wouldn't know what to do with them.

"Anyway, from what you just heard, the Civil Rep will be here soon to speak with you."

Corley nodded. "Should be fun." He placed the box of candles on the small table next to his chair, then crossed his legs, catching the topmost knee in his interlaced fingers. "Tell me—you ever been in a situation you thought you might not get out of? Or this—have you ever been sick, real sick, and thought you might die?"

"Well, no. I guess I haven't thought about it much."

"Well, you should. Gives a man a whole new perspective. And I don't mean no maudlin sentimentality about things, either. Hah! Self-pity will rot your gut out faster'n anything I know. Take my word for it! But you got to look at things. Pay attention to what's happening, to what you're doing. It's too easy to get in a rut, to get so used to something you don't even know it's there. And that's bad."

Corley leaned forward as his tone became more confidential. "Did you know there are people walking around today just out of force of habit! They might as well be dead for all they see or hear. Chuck a rock in their path, trip 'em up, and they're lost—don't know what to do. Now you take jobs, for instance. A job's a nice cozy thing you can get wrapped up in; go to work at nine, eat lunch at noon, go home at five. It's a ready-made philosophy. Why do you think so many people retire and then go screwy, or just vegetate? 'Cause without work, they've got no philosophy to live by, nothing. They used their jobs as an excuse to get up in the morning. Take away that excuse, and they start thinking maybe it's not worth gettin' up in the morning. Or ever. And that's *real* bad."

Dron felt bewildered. "Forgive me if I don't understand, but what does that all have to do with the Civil Rep coming out here?"

The old man eyed him with an enigmatic stare. "You really don't know, do you? Oh, well, no matter. You're here, and that's a start."

A movement caught Dron's eye, and he turned slightly to look at the window. The colorful cloth hanging from the cornice had filled out with air and fluttered briefly. He tried to imagine the large plastic panels of his compartments fitted with such odd decorations, but they were too alien.

"That's a nice thing about curtains," Corley said softly, noticing Dron's glance. "They let you *see* the breeze as well as feel it."

With that, Corley said no more until the arrival of the small, two-man craft with its solitary passenger. The man who emerged from the craft looked to be about Dron's age, thickset without looking fat. His reddish hair seemed not to go with his slightly pale complexion.

He stood for a moment before the

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house, alternately looking at the structure with a studious eye and marking down notes on a clipboard filled with forms. His whole manner seemed to be unconsciously methodical.

Corley and Dron met him on the porch. They waited silently as he removed his sunshields, revealing a pair of emotionless blue eyes.

"I'm Representative Bartow, from Master Planning," he introduced himself, glancing only momentarily at Corley before fastening his gaze on the other.

Dron met the man's inquiring look. "Dron Gordon—I'm first shift crew chief for the channel train over there."

"Then I'm sure you'll be anxious to resume work," Bartow replied, in a way that was not unfriendly but routine. He looked over at *Cutter 4*. "Aren't all the crews listed as off duty?"

Dron nodded. "Until second shift. But I needed to perform routine inspection on some of the equipment."

"Is everything all right?"

"Yes."

If Bartow had any objections to Dron's presence, he did not voice them. "We may as well go inside and get started."

Within, Bartow studied the interior of Corley's house with as much attention as Dron had, but objectively, not appreciatively. Sitting cautiously in one of the hand-wrought chairs, he propped the clipboard against his knee.

"Now, I have your name here as Corley Jennings," Bartow began. "Is that correct?"

"Yep." Corley sat down across from him and folded his arms.

"I want to make sure that you understand the situation correctly. This . . . *structure* here is squarely in the route of the channel leading out from Reba City. You do understand that?"

Corley give a sidewise twitch of his head. "Reckon it couldn't be much plainer!"

Bartow's features held an odd expression momentarily, and he made several more notations on the topmost form. "You do realize that independent land use at this stage of development is fairly restricted?"

"Seems I've heard as much."

"It's a very old legal precept," Bartow continued, "but the matter of eminent domain still applies in cases such as this one. The channels are of great importance to the colony's expansion. So, of course, your building simply cannot stay."

Corley interrupted. "Young man, you have an odd habit of peeking under your eyebrows instead of looking a person square in the face."

Bartow ceased looking down at his notes and raised his head a fraction. "As I was *saying*, your building cannot stay in its present location. One way or another, it will have to be moved. And as quickly as possible."

Corley's slight smile did not fade. "Representative—and that's an interesting term, by the way—you seem to be a bug on legal matters, so tell me this. Are you familiar with the notion of *Honored Citizen Status*, which was set forth shortly after Landing Day?"

"That was a few years before my time, but I believe it had something to do with granting certain privileges to the relatively small number of Earth-born original colonists who still sur-

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vived. Why do you mention it?''

Corley rose from his chair and went to his desk. In the bottom drawer was an etched metal plaque. He removed it and brought it over to Bartow.

Quickly scanning the etched words, Bartow looked up with mild surprise. ''And—you're claiming right to this area by virtue of that status?''

''Well, I'm not rightly sure, yet. But it does give you something to think about, doesn't it?''

Bartow quickly wrote down nearly half a page of information on the reverse side of the form he was completing. That done, he then went through another long string of routine questions, as quickly as Corley's unorthodox answers would permit.

''I'm still sure there's no doubt as to the eventual outcome of this,'' Bartow said, rising. ''But I will report what you've said. There's nothing else I can do for now.''

He excused himself and left the house. Dron was about to leave too when Corley caught his arm as he neared the door.

''Hold it a minute there, youngster. I want you to try something when you get the chance.'' He pressed one of the candles into Dron's hand, along with several twigs, their tip ends chemically coated. ''Those little things are matches—you use one of those to light the candle. Just scrape it on anything rough. Works pretty well for a homemade concoction. Got most of the ingredients from a chemist friend a while back. Anyway, what I want you to try is this: some night when you're having dinner, light the candle and put it on the table, up high on top of something. Don't use your compartment lights. See if it makes things look different—see it with a different part of your mind, not just the reasoning part.''

Dron frowned at the objects in his hand.

''Just give it a try,'' Corley urged. ''I remember, when I was ten, there was a young couple down the block from us. They used to have candlelight dinners a lot—a real romantic pair. It was a small town, not too modern or anything, and they used to sit out in the front yard and look at the moon at night. People used to do silly things like that. Course, we don't even have a decent moon here—just *Pilgrim,* spinning around up there like a cast-off tin can.''

''All right,'' Dron said absently. ''I'll try it sometime.''

''And one other small thing. You do have a library link, don't you?'' As Dron nodded, Corley replied, ''Good. I want you to look up something. Check the library file on an ancient Greek dramatist by the name of Euripedes—'' he searched his memory ''—file reference 6-24-5, line 15.''

Dron sighed and wrote it down, unsure of why he was so willing to humor the old man. ''Is that all?''

Corley grinned. ''For now.''

Bartow was next to his own craft when Dron emerged from the house. Placing the candle and the matches in his jacket, he headed toward the man.

''Could I ask a favor?''

Bartow looked up from his clipboard as he completed the form. ''Favor?''

''I wonder if you could tell me now what the status is on this matter.''

''Well, it looks like it's going to be more complicated than I thought. Be-

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fore we can force him to move, I'll have to go through certain procedures. It will take a little longer."

"Then I'd better notify second shift that they won't be starting today." Dron hesitated. "One other thing—would it be possible for me to go back with you to Master Planning Headquarters?"

"I guess so. Why?"

"I'd like to check on something there. Besides, with the shut-down, I have nothing to do. There's no sense just sitting around."

Bartow nodded understandingly. "That's reasonable enough."

"Good. Let me go alert second shift on the commo-link and send the work shuttle back. I'll only be a few extra minutes."

When he came back to the small shuttle, Bartow was already inside. Dron climbed into the other seat and fastened the harness. Doors locking down as the turbines picked up speed, the craft waited only a moment more before lifting off and arcing away from the area.

Dron settled back for the flight to Colony Base Prime. "Is this thing going to boil down to a case of which law takes precedence over the other?"

"No," Bartow replied, looking at the horizon. "Under normal circumstances, it might be more difficult, even though the channels still must come first. But, Honored Citizen Status or not, Jennings can't be taken too seriously."

"Oh?"

"The man's almost certainly unstable. Anyone who would affect an old Earth dialect like that can't be completely normal."

"I'm not so sure."

"What do you mean?"

"Sometimes I get the impression it's all pretense . . . that he's inwardly amused by us."

Bartow shook his head slowly. "I can't see it. What reason would he have—that would make *sense*. No, it still brings us back to the matter of instability. I'll have my supervisor come out in the morning, and if he confirms my suspicions, the only reasonable thing to do will be to place Jennings in a care center."

Dron looked at him coldly. "Are you sure you're not just taking that course because it's a convenient way of solving the problem?"

Bartow's features hardened as he looked around at Gordon. "The problems I have to solve involve more than your Channel," he said dryly. "As a Civil Representative it is my duty to see that all needs of the colony are met. Personal, practical, psychological, or otherwise. If Corley Jennings does need professional care, then it is to his benefit to receive it."

"If he needs it. But I am beginning to wonder if he may be a lot more stable than we think."

It was mid-afternoon when the shuttle landed atop the massive circular building in the center of Colony Base Prime. The upper deck of Master Planning Headquarters served as landing pad for many of the official craft used daily in matters concerning the colony.

Leaving Bartow to his work, Dron headed for an elevator. Although his wife was working somewhere within the large forty-level building, the Education Center was not his destination. Instead,

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he went down to the thirty-eighth level, which was devoted exclusively to the Planning Section.

Entering the office labeled "Visitors' Center," Dron started toward the desk of the on-duty clerk, but his attention was distracted by the display area off to the right. One wall was nearly covered with a combination of photos and artwork depicting various stages of construction and expansion. In front of the wall was a three-dimensional display stand which mapped out in structured plastic the pattern of cities and interconnecting channels being built.

Diagrams showed how the intercity laser communications system would operate, as well as the pneumatic transport tubes for personal correspondence and small parcels. Labels explained how the interconnecting water system would be utilized in case of trouble at any of the individual cities' water-processing plants.

Not far away from the display was another stand, smaller and permanently air-sealed. Within its transparent structure was the last remaining original text copy of the Master Plan. Its contents had long ago been transferred to numerous duplicates, in facsimile, tape, and other forms. But this old, printed book now commanded a respect once reserved for ancient religious relics.

Dron's thoughts returned to the matter that had brought him to Level 38. Going directly on to the clerk's desk, Dron waited as the young woman finished programming the next day's scheduled agenda for the Council.

She looked up at him, her high forehead eclipsing the bun of tied-back hair that sank beneath the horizon of her head. "Yes?" she said dryly.

"Who is in charge?" Dron aked.

The woman blinked. "In charge of what? Each division has its own chief engineer."

"But over them there must be someone . . ."

"The Council has ultimate authority for all matters of planning."

Dron pressed on. "What about matters other than planning?"

"If it's anything other than planning, then you'll have to see a Civil Representative. The Civil Center's information desk is four levels down—"

"I've spoken with a Civil Rep already," Dron countered. "What I'm trying to find out is if there is anyone, or any group, that oversees both planning *and* civil matters."

The young woman frowned slightly, and she seemed not to understand. "Is this an official matter? You should have had your work leader inform his division so that the proper office could be notified. It only complicates matters if you try to bypass intermediate offices."

"It's only indirectly official, but I think it may be important. Would it be possible to see a member of the Council?"

"If there is a legitimate reason, then I can try to schedule a meeting for you," she replied, checking the facsimile listings of the next few weeks' agenda. "But it would be quite a while before I could fit it in."

"There isn't much time."

"If you'll give me your name and job title, and your division, and an explanation of why you desire a meeting, I'll submit the request as soon as possible."

The door behind her opened and six

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people emerged. One of them, a man in his fifties by appearance, noticed Dron's presence. The others were busy talking among themselves.

Dron still protested. "Look, as I said, this isn't truly an official matter, and time is an important factor. I—"

The young woman's fingers were poised over the keyboard. "Your name, please?"

Dron was about to give up on what seemed to be a futile effort when the man who had been watching him approached the desk. The man's eyes bore a curious look that went beyond the matter of Dron's presence. "Is there a problem?"

The young woman turned and saw him, smiled, and said, "No, Councilman Freitag. This man wishes to arrange a meeting with the Council, and I have explained the fact that it will take a while—there are so many pressing matters—"

"What is your name?" Freitag inquired of him.

"Dron Gordon, Councilman. I'm a crew chief, Channel Engineers."

Freitag nodded slowly. "Your father is Karl Gordon?"

"Yes, but how—"

"I'm not surprised you don't remember. You only saw me a few times when you were quite small. Your father worked with me many years ago, during the construction of Colony Base Prime." He smiled in recollection. "You remind me quite a bit of Karl in his younger days."

Dron did not remember him, but returned the smile. "My father is now supervising construction at the Baker City site. In another year, I think he may make Division Head."

"No doubt he will. But what brings you here? Why do you wish to see the Council?"

"Are you aware of the shut-down on the East North-East channel from Reba City—the Corley Jennings matter?"

"I was informed of the shut-down, but not the cause."

"The cause is a man named Corley Jennings—and his house. I have just come back from seeing him, with a Civil Rep named Bartow."

Freitag replied, nodding, "Then I probably won't receive a complete report from the Civil Center for another day. What's the problem—do you feel they're processing the matter too slowly?"

"No, too quickly," Dron answered, hastening to explain. "Although I am anxious to return to work and resume the channel's progress, I am afraid the old man—Jennings—may be swept up in procedural efficiency without a chance to be heard. All I'm asking, really, is that someone in a high position speak with him."

"Well, the Planning Council doesn't have direct authority over *individual* civil matters. Our principal job is to oversee the implementation of the Master Plan."

"But it's not solely a civil matter, since the channels are a part of the Master Plan, and progress on one of them is halted. The Council has a legitimate reason to be *interested* in what happens," Dron said carefully. "Don't you think?"

Freitag arched an eyebrow and glanced downward. "I suppose an inquiry to the Civil Center wouldn't hurt anything. I'll

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see what I can do. But I can't guarantee what will come of it."

As Elena came through the door to their compartments, Dron rose from his seat and went to help her with the large package of laundry she carried. He had checked earlier at the central pick-up point in the hall, but deliveries had not yet reached their level.

She let him take the package, pointing to the marking on top as he did. "You've finally been issued new work clothes for that worn-out pair." She paused. "How long have you been home?"

"A little over an hour," Dron replied. "I was over at Master Planning Headquarters before that."

Elena looked at him oddly. "I thought you went out to the work site."

"I did, but I talked for a while with Corley Jennings—the man who built the house. I came back to the Headquarters building with the Civil Rep, who went out to see the old man."

"What happened?"

"Nothing much. Bartow—that's the Civil Rep—checked on Jennings' records, and said he'd send his superior out to talk with him in the morning. Bartow thinks the old man's unstable."

Elena's features clouded. "Then the second shift didn't start today, and you won't be working tomorrow either."

"It doesn't look like it."

She frowned and walked over to the table, looking at the flowers that were no longer either blue or triangular in shape. "These have wilted." She sighed. "I'm afraid there aren't any more blooming in the balcony planter yet."

She went to throw the faded, curled blossoms in the wastebag. "Why were you talking with the old man anyway? Someone unstable like that . . ."

"Bartow's the one who thinks he's unstable."

"And you don't?"

"I'm not so sure," Dron mused, looking away from his wife. "He's like no one I've ever met. Sometimes he seems to make no sense, yet I don't think he's really crazy. When he looks at you it's as if he knew everything about you. There's no sign of fear or anxiety in his eyes. Only confidence."

Elena looked at him reproachfully. "Perhaps what you see as confidence is only mindlessness."

Dron shook his head, but did not argue the point. He turned in time to see the light flash on the wall, indicating their dinners had arrived.

While he removed the thermal covering, Elena tore open the laundry parcel and carried part of its contents into their sleeping compartment. In her absence, Dron removed from his pocket the thing Corley had called a candle. He looked at it for a moment, feeling its waxy surface as he turned it in his hand. He looked around for something on which to place the candle, but there was such a sparsity of objects suitable for the purpose that he almost decided to forget the experiment. Then his eyes fell on the smooth cylindrical form of their small emergency light. It was only a little larger in diameter than the stubby candle, and twice as long. He stood it on end, lens side down, and placed the candle on top.

Elena returned to the main compartment for the remainder of the laundry. She picked up the clothing articles,

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then as she straightened, saw what Dron was doing.

"What is that?"

"A candle," Dron replied. "Corley Jennings gave it to me."

Elena sat the laundry back down and approached the table, still looking at the waxy object. "Don't tell me he actually uses such a primitive light source out there where he lives."

"What choice has he? That house has no power connection. He has no generator and no way to recharge battery lights."

"The choice he has is that he can either live out there in the wilderness or here in a civilized area."

"But he likes it out there. And he seems to get along very well without what we have here. He even fixes his own food."

Elena frowned. "Well, why did he give you a candle? *We* certainly don't need one."

Dron shrugged. "He wanted me to try something. He seems to think that they have some kind of esthetic quality beyond their function."

She looked at Dron as if she had concern for his own sanity, but watched as he took one of the matches and struck it on the textured grip of the emergency light. When the match blazed into life, Dron nearly dropped it. Corley's homemade igniters had a tendency to spit and sputter, but Dron was finally able to light the candle before the burning twig had to be extinguished.

Elena sat down at the table as Dron went to the compartment's light control to turn it down. When he had adjusted it to one-quarter normal brightness he returned and sat down.

He broke off the eating utensil that was tabbed onto the disposable plastic food tray and started to eat. But his mind was on the flame—that odd, burning point of light that heated the air around it.

Dron had seldom seen flame except in wilderness fires started by thunderstorms . . . a distant, elemental force of nature. And that did not lend a pleasant quality to this tiny cousin of the larger blazes. Still, the candle seemed innocent enough—even relaxing.

The pale, slightly amber glow had a softening effect on everything it reached. Even Elena's quietly attractive features seemed to take on a deeper quality of beauty in the golden light. The dark brown of her hair faded into shadow at points, and her eyes seemed more translucent, reflecting tiny mirror images of the candle flame.

"Jennings said this would make things look different," Dron told her. "He said we would have to see things with a different part of our minds."

"It's hard to see anything in this light," Elena replied, and there was no humor in her words. "I don't understand. I don't understand what the old man means, and I don't understand why you're doing this."

Dron sighed deeply. "To tell the truth, neither do I. But there's something . . . something about what he says that seems to make sense of the past. Something that makes it real and tangible."

"Why should the past matter? Our history tapes explain everything about Earth and the colonizing effort."

"The information is there," Dron agreed. "But something is missing.

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What, I don't know . . . yet."

Elena tried to change the subject. "I made a call to the Reba City Residence Center today. There's a set of compartments available that is in almost exactly the same location there as ours is here. We can move there as soon as I've trained a replacement for my job. That shouldn't take more than a few weeks."

"All right. I'm glad you arranged it. The move itself won't be too bad. We'll parcel our clothes and belongings and take the Reba City shuttle."

Elena's face bore an unenthusiastic smile. "At least we'll get newer furniture without having to wait for the old to wear out. I hear that they've even gone ahead and issued furniture for the children's sleeping compartment in each residence."

"Which won't help us any," Dron said casually, looking down at his food. "We haven't even *one* child yet, let alone the four the Planners would like."

As Dron looked up, he saw his wife's face fall. Without saying anything, she put down her eating utensil and left the table, disappearing into the other compartment. Dron lost his own appetite suddenly, a growing anger with himself filling his mind. Pushing violently back from the table, he got up and left the compartments.

By the time he returned, the dinners were cold. The candle had melted down into a congealed puddle and gone out.

Dron entered the other compartment. Elena was there, sitting on the edge of the bed and gazing out through the transparent panel past the balcony. The expression on her face was neither anger nor hurt. It was despair.

She saw him, and her expression softened. "I've been thinking," she began, her voice quiet. "Maybe candles are really no different from things like flowers. I grow them and cut them, and bring them in to look at—for no real purpose but to look at them. Maybe candles are like that."

Dron went and sat next to her. "Yes, maybe they are. Maybe there are a lot of things like that." He put his hand over hers and gripped it tightly.

Elena searched his eyes. "What do you really think of Corley Jennings? What is he? Why has he such a hold on your thoughts?"

"I really don't know," Dron said honestly. "Maybe it's because his very presence makes me think . . . about a lot of things."

"Like the candle?"

"That, and others. Today, before I left his house, he told me to look up something. I checked the library link for the file reference he gave me while I was waiting for you to come home—Euripedes, an ancient Greek dramatist, centuries ago on Earth."

"What was it?"

"Just a fragment of a larger work . . . a saying . . . 'The gods visit the sins of the fathers upon the children.' "

Elena rested her head against Dron's arm. "Do you know what it means? About the sins?"

"I think so," he replied. "And I wonder . . . Does the same apply to dreams?"

The second morning of the shut-down was very much like the first, except for

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the added weight of repetition. Such idleness was repellant, and Dron felt the same self-conscious boredom and uneasiness he had felt the day before.

Elena had left for the Education Center immediately after breakfast, and in the following two hours Dron had accomplished nothing. He had turned on the compartment's viewer for a while, but only the learning programs were on at that time. Although the educational shows brought back childhood memories, they held no interest for him.

Dron was about to leave and go to the work base, even if there was nothing there for him to do but sweep the dust from the floor, when the call came from Master Planning. Bartow had a message for him.

"It seems you didn't have to worry about Jennings being placed in a care center," the Civil Rep told him.

Dron moved closer to the commo unit. "Why?"

"My supervisor just got back from seeing the old man. He tested him for an hour and informed me that Jennings is not only sane and stable, but also totally in command of his faculties." Bartow paused, and his voice took on an uncertain tone when he resumed. "It's all very puzzling. My superior said that Jennings didn't lapse into that old-Earth dialect even once. But I still say that if it's all pretense, it makes no sense at all."

"What are you going to do now?"

"All I can do now in an official capacity is enforce the Center's ruling that he'll have to move. But the Planning Council has gotten into this somehow. Two of the Council members are flying out with me this morning to see Jennings." Bartow hesitated. "Look, I know you're interested in the outcome of this. If you can make it over here in fifteen minutes, you can go with us in the shuttle."

"I'll be there."

Dron Gordon left the elevator and walked across the upper deck of Master Planning Headquarters with the others. As he had expected, Freitag was one of the Council members making the flight. The other was a woman council member named Parquet.

Boarding the shuttle, everyone settled into their seats and secured their flight harnesses as Bartow programmed the shut-down site's coordinates into the craft's guidance system. The turbines started up and, in another moment, the shuttle lifted off the top deck of the building.

Dron watched as Colony Base Prime receded into the distance like a concrete oasis in the midst of a vast wilderness. But it was a lush, green wilderness that surrounded the city, stretching in every direction. The city's location in a temperate region, relatively near the Southern coast of the Eastern Hemisphere and Barnard's Sea, made it a continual garden spot. Yet the unrelenting vegetation had a sometimes disturbing aspect to it.

The faint whine of the turbines was a reassuring reminder of technology's support as the miles of untouched land moved swiftly beneath them. Dron resettled himself in his seat. At times like this he was aware of the tenuous grip they had on the planet, of the fragile thing their society was compared to the massive power of nature. The natural world, like man's world, depended on

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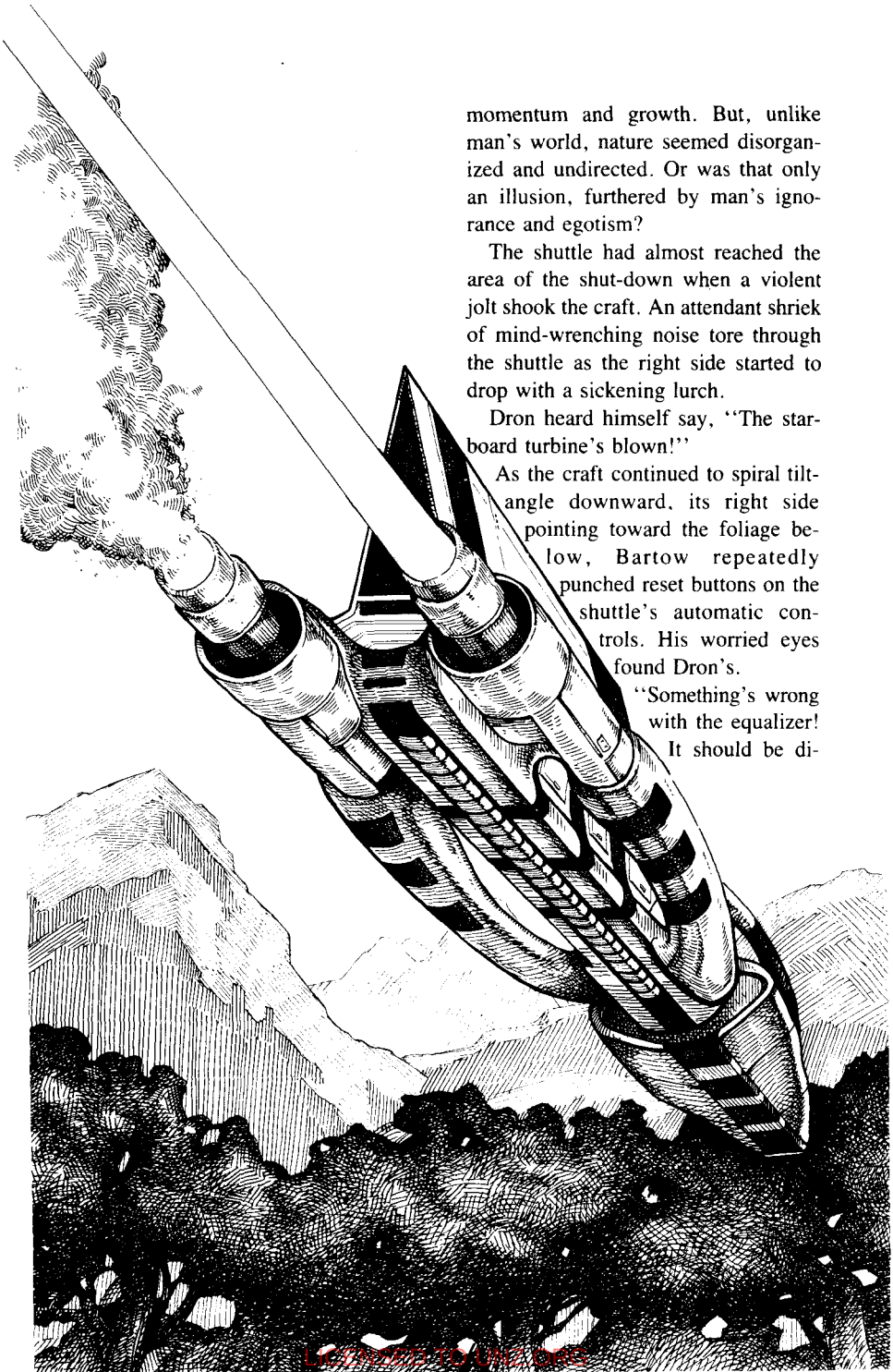

momentum and growth. But, unlike man's world, nature seemed disorganized and undirected. Or was that only an illusion, furthered by man's ignorance and egotism?

The shuttle had almost reached the area of the shut-down when a violent jolt shook the craft. An attendant shriek of mind-wrenching noise tore through the shuttle as the right side started to drop with a sickening lurch.

Dron heard himself say, "The starboard turbine's blown!"

As the craft continued to spiral tilt-angle downward, its right side pointing toward the foliage below, Bartow repeatedly punched reset buttons on the shuttle's automatic controls. His worried eyes found Dron's.

"Something's wrong with the equalizer! It should be di-

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verting half of the port turbine's pressure to the starboard lifters. But it isn't!"

"Isn't there anything we can do?"

"You tell me!"

The others sat in silent terror as the spiralling shuttle plunged closer to the ground. Bartow was still desperately trying to get a response from the reset controls when the craft shot between two of the taller trees and swept toward the lower foliage.

Its right side still tilted down, the shuttle tore a ragged hole through several hundred feet of leafy growth, made contact with the ground, and slid for another hundred feet. Its path carried it to a meandering brook, and the craft turned completely around, front to back, as it plowed across the water. Only at the opposite bank did it come to rest, one edge jammed up against the base of a tree.

The port turbine had stilled, and now the only sound was of pressure leaking from somewhere beneath the craft. Dron looked at the others. Bartow seemed all right except for a large, quickly turning bruise on his pale forehead. Freitag and the Councilwoman seemed a bit shaken up, but showed no outward signs of injury.

Dron released the catch on his harness and got up, balancing himself on the uneven deck. As he rose, he saw the bulged portion of the flooring directly beneath him where a small fragment of the turbine impeller protruded. Had that flooring been less hard . . . less resistant . . .

As quickly as possible, he helped free Bartow and the others from their harnesses, then freed the craft's door from its locked position. When all had safely left the downed shuttle, Dron turned his attention to the craft's underside.

Bartow walked up beside him. "Quite a mess." He touched his bruised forehead gingerly and looked at the shattered starboard turbine housing.

"Look there—" Dron pointed. "Fragments of the turbine must have damaged the equalizer duct. That's why no pressure reached the lifters on that side."

"With that ruined, there's no way we can even limp back to a controlled area."

"We'll have to notify Master Planning."

Bartow shook his head. "I already checked the commo-link while you were helping the others out. The unit's inoperative."

Dron considered. "We can use the unit in *Cutter 4*. We can't be too far from it."

"Do you think you can *find* it?"

"We're going to have to try."

The wilderness had what seemed a deadly silence. Not a lack of sound, but a lack of *manmade* sounds. No reassuring hum of air-conditioning units or engine noise from large equipment. Dron had noticed the odd effect before, while in Corley's house, but somehow it was all the more unnerving in the midst of this uncontrolled, uncivilized area, where nothing showed the mark of man.

They walked for twenty minutes across the moderately level terrain, crossing the open areas and staying away from the areas of denser growth, where dangers might be lurking. Dron knew there might be tuskers in the area,

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the wild boar-like beasts of Novus One that could easily kill a man. Even in the open areas, there were occasional tall shrubs with overhanging leafy growth, and they took advantage of what shade was available.

Dron only hoped he knew where he was going. After being shaken up in the shuttle crash, the others were at a disadvantage. Dron wondered how far the shuttle had gone from the correct course during its high-speed descent. He could not be sure how far or in what direction the spiral had carried them.

Then suddenly they were not alone. Emerging from an area of heavy growth to their right came a tall energetic figure. It was Corley, white hair standing out in a striking display of contrast against the verdant green, a staff of knurled wood in one hand. He motioned for them to follow, like some modern-day Moses.

"Lucky thing I heard that ship of yours go down," Corley was saying as he settled into his chair. They were all seated comfortably in the strange old house's living room sipping cool water from Corley's homemade ceramic mugs.

"You should have followed that brook—not gone west," Corley continued, adding to Dron, "remember I told you about the brook I get my water from?"

Dron nodded, embarrassed by his not remembering. The route he had been leading them on would have been twice as long as necessary.

Councilman Freitag lowered his mug, held it in both hands. "We owe you our thanks for helping us. And for your hospitality."

"If you're hungry," Corley started to get up, "I can offer you fresh fruits and vegetables—"

"No, thank you. Not right now." Freitag looked down at his water, brow knitted. "Do you know why we're here?"

"I imagine I know why *that* one's here," he replied, indicating Bartow. "His boss was out here this morning, a little earlier. Had us a nice talk, we did. But the final gist of it was that I still have to move. So I reckon Mr. Civil Rep here is gonna serve me papers to that effect."

Bartow shifted uncomfortably in his seat, his hands clutching the envelope he had brought with him from the downed craft. "*Why* do you insist on using that archaic speech?"

Corley studied him a moment. "Because it pleasures me. Reminds me of a long-lost time, and of home. And there's precious little that does any more."

"But you're living in the past!"

"Am I, now? And what exactly are *you* living in, young man?"

Bartow frowned. "In the present, of course. And *for* the future."

"Nicely put," Corley grinned. "For a young whippersnapper. But I'm willing to bet that you're living in the past more than I am. And it isn't even your own past."

There was a brief silence.

"Bartow may be here on Civil Center business," Freitag began, "but Councilwoman Parquet and I came here to talk to you . . . to find out more about you, and to see that this matter is handled fairly."

"Well, that's sure nice of you folks

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from the Planning Council. Especially since you're the ones responsible for that channel train sitting out there pointed menacingly at my front porch."

Freitag straightened. "But *we* didn't pick the route the channel would take. That was all done well in advance, many years ago. It's part of the overall engineering work."

"That's supposed to make it right?"

"The location of the cities and channels has been part of the Master Plan since the first Landing Day. Certainly before you built this house!"

"For that matter," Corley added, "I was living in a house exactly like this before any of you *or* your parents were even born! And this colony is just an extension of Earth, isn't it?"

"But you can't justify it that way," Bartow spoke up. "Even if you could somehow transfer it to this world, the idea of property rights just doesn't fit with the system of colonization here. You have no right to ruin the work of all the others—to jeopardize the development of our colony."

"And you think this system is a real whiz-bang goodie, don't you?"

"Well, *of course*!" Bartow held up both hands in a helpless, frustrated gesture. "It was a fantastic technological achievement that brought us here, enabling us to live in this world."

"You don't live in this world," Corley said, with a broad sweep of his hand. "You live *on* it. *Pilgrim* had a completely enclosed and controlled eco-system. It worked good enough, for its purpose. But instead of fitting that way of life into this planet's own system, we've just *imposed* it on top of everything."

Freitag looked at him oddly. "How can you criticize it when you yourself were a part of this effort from the beginning?"

"Exactly *for* that reason," Corley countered. "Because I *have* seen this all from the beginning. What's happened here is no great surprise to me. I saw this coming long ago. I had hopes that after people had been here a while, this planet would have an effect . . . sort of naturalize everyone. But that's not happening. Not yet, anyway." He paused. "How many generations are you going to waste before you all get back to normal again?"

Councilwoman Parquet seemed especially disturbed by his words. "What do you mean—normal?"

"I mean, just exactly when is this colony going to start behaving like something more advanced than some kind of giant amoeba, growing and dividing itself at regular intervals. There was a need for strict adherance to practical matters during the trip here, but somewhere along the line, people got used to it. You know, getting thousands of people to work together for a common cause was the *real* achievement of *Pilgrim*'s flight and this colony. What a miraculous thing that the nations of Earth could have cooperated long enough to make such a venture possible! But somehow, something's been lost. There's no real feeling for the past."

"The past is known to us," Parquet asserted. "The history tapes carried in *Pilgrim* outline everything. And from my own experience in the Education Center I know that events on Earth are adequately covered. Perhaps not as much time is spent as we might like on

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such matters, but basic education and job training must take up most of the study time. It's essential."

"But teaching the past as history is not enough."

Parquet shook her head slowly. "From what I've seen of Earth's history, there is much that would be better forgotten."

"I never said Earth was perfect," Corley shrugged. "We left a lot of the bad stuff behind when we came here. A lot of the good stuff too, unfortunately. You've just sort of accidentally wandered into a social system and you don't know what you've got. Of course, that's been true of most generations. Only most generations before also had a few new ideas of their own. *New* ideas. I haven't seen many of those lately. You people are like a bullet from an old Earth gun. You got fired off a ways back and you just keep on going in the same direction without knowing where you're heading."

Freitag stood up suddenly, pacing to the window. "I just can't agree with that. With the Master Plan to guide us, everything is mapped out to ensure a perfectly coordinated colony layout, without the pitfalls of unplanned growth. *You* saw Earth, you know what the cities there were like—totally haphazard in their development. The history tapes are full of examples of poorly devised living areas and the ridiculous problems people had to cope with."

"That's true enough. In a way, you've got a good thing going. Everything's real nice . . . *but*," Corley emphasized the point with a thrusting finger, "it's also nice and bland. That's the problem—all the nasty things are pretty much gone now, but nobody's really filled in the vacuum with anything else. Except work. And what happens when the expansion program is finished? I'll tell you what. Everybody's going to go nuts!"

Bartow leaned forward, mild anger in his eyes. "I don't think the program needs defending but the simple truth is that the expansion program will take centuries to complete. We have been here thirty years and have only two cities completed and occupied."

"So far. And *such* cities!" Corley smiled and shook his head. "There are who-knows-how-many miles of habitable space on this continent alone. Yet you're all clustered together in neat little cities just because for generations people have been used to living cramped up like sardines."

Councilman Freitag answered that charge. "You can't expect a colony on a new world to spread itself thin. It would be folly to risk the dangers of the uncontrolled regions."

"That was a good excuse twenty-five or thirty years ago! Not today. Besides, if you hadn't been so isolated, there wouldn't *be* so many uncontrolled regions. And, for that matter, who says things have to be controlled?"

"We're working on it," Freitag insisted. "The channels are an important part of the Master Plan—a complete interconnecting system for power, communications, water supply, everything. If there's trouble with any one part of the system, the rest will be able to compensate. It's all part of the design."

Corley nodded. "The Master Plan is a pretty ingenious bit of work, all right. Trouble is, the people who designed it never intended to live by it."

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"Well, how could they? None of them were young enough to ever see this world. Most of the planners did not even make the voyage. They had too many other important projects." Freitag folded his arms, looking very solemn, as he continued. "When the nations of Earth decided to make a colonizing effort, it was a tremendous gamble. But when the information came back from their deep-space probe about this world, they decided to take the chance. They knew that, due to the great distance involved, commerce with the colony would be nonexistent until a faster-than-light propulsion system was developed. Instead of waiting for that, they went ahead and prepared *Pilgrim* and the Master Plan, so that there could be a working, living colony in operation once the expected breakthrough was finally made."

"Fine. But why limit yourselves? You've got a whole new world. You should be exploring it. *You should be enjoying it.* But what do you do? You try to parcel it up into neat little sections! You're going to end up with a whole bunch of carbon-copy cities."

"So what do you suggest?" asked Freitag, an edge of sarcasm in his voice. "Just forget the plan altogether?"

"No, no," Corley fumed. "You don't have to chuck the whole thing out . . . just liven it up a bit! Everything's had to be *functional* for so long that nobody knows how to do anything just for fun any more."

Councilwoman Parquet eyed him strangely. "Fun?"

"You know, people actually used to go out and eat in places called restaurants, places that were all prettied up just to make 'em look nice. And there were things like parks and bands, and books you could hold in your hand and read under a tree. And art! There's more to art than drafting, although that's all that's taught anymore. And there's more to life than just functioning. There are so many things the Master Plan just didn't provide for. They gave you a good skeletal structure to build by, but they didn't put any flesh on the bones."

Freitag gave up. "Perhaps. Maybe you're really wiser than all the rest of us put together. I certainly can't question your experience." His tone was not convincing.

"Well, don't take my word for it. Age is no guarantee of wisdom. Hardly! Back on Earth I knew some old fogies who were pretty sure they had it. They had their opinions, all right, on politics, women, you name it. And they were blamed sure they were right, too!" Corley scratched his chin. "But that's the whole point. A *wise* man knows better'n to be sure about anything. 'Cause there's always more than one way to look at something.

Bartow stood up, looking aggravated as he spoke to Freitag. "How can you argue with someone like that?"

"He can't," Corley answered, grinning at his own meaning.

Bartow advanced toward the old man, envelope extended. "I can't see any further point in discussing the matter. The official ruling explains everything. This house will have to be moved within thirty-six hours at the latest."

Bartow stormed out of the building, the others following him. A short distance away, the new shuttle they had called out to transport them back sat

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waiting eager to return.

Elena was about ready to depart for work the next morning when the call came for Dron. He was preparing himself for another day of inactivity, but the work-site coordinator's message changed all that. He was to report for duty immediately, to begin first shift. Elena left the compartments looking happier than she had in recent days.

But Dron was not completely pleased with the news as he traveled out to the area. Things were back to normal, it seemed. But were they truly resolved?

Zaba and Cam Lin went directly to their machines, but Dron went instead to the old house. The structure was now a good sixty meters back away from the path of the channel. Ruts and other marks of heavy equipment ran from its previous location to its new one.

Corley was sitting on the front porch admiring the view. Dron walked up to him. "When . . . ?"

"Crack of dawn!" Corley said brightly. "Some men came out here with a bunch of fancy hydraulics and moved it without a scratch. Your boss—name of Abbot—he was real helpful."

Dron looked back to the previous location. "Did they fill in the root cellar? I don't see any trace of the hole."

Corley scratched his head. "Funny thing about that root cellar. It wasn't in the way, like I thought it was. I don't know what made me think that."

Dron looked back into the old man's eyes. "Why did you tell the Council members what you did yesterday?"

"A man ought to speak his mind, don't you think?"

"Yes, I suppose. But it didn't help matters any."

Corley shrugged. "We'll see."

"Are you still going to live out here . . . away from everything?"

"Like I told you before, this is my home. And *I'm* not the one who's living away from everything." He extended his hand. "Do come visit some time if you get the chance. I don't mind talking if you don't mind listening."

Dron felt Jenning's firm handshake, and knew he probably would come back, in person or in thought.

Corley smiled to himself as the younger man walked over to the cutter and boarded it. He was satisfied with the results of his and Dron Gordon's encounter. An encounter he had prepared for so long ago.

One man cannot change a world. But one man *can* change another man, who can change other men, who can change more men. And many men *can* change a world.

It had taken no great amount of effort to find out the route of one of the channels, and then build in that exact spot. He had had to wait quite a while, to see if they would indeed come. There was always the chance that they might not have, but that chance seemed remote. After all, they had the Master Plan to follow, and he'd suspected years before that there would be not so much as a micron's variation from it. He was right.

Corley watched the channel train start up, move ponderously past his simple residence, and head off toward the distant horizon.

He wondered where they were going . . . ■

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Jay Kay Klein's

BIOLOG

Ben Bova

A non-Euclidian axiom held by a generation of *Analog* readers was that no one could replace John Campbell. Still, Ben Bova received science fiction's Hugo award for best editor five times out of a possible six between his appointment in 1971 and resignation in 1978, plus another in 1979 which was partially for his work at Analog. Both editors achieved distinction as science fiction writers, though Ben comes equipped with a humanist point of view rather than with John's technological oversight.

Ben was raised in Philadelphia's south side where, as he likes to say, the neighborhood was so tough people ate raw spaghetti straight from the box. After receiving a journalism degree from Temple University, his first calling was as a newspaper reporter, including a stint on the *Philadelphia Inquirer.* He later did graduate study at the Georgetown University School of Foreign Service. Close contact with technology came as a technical writer and then as marketing manager for Avco Everett Research Laboratory in Boston, where he worked with scientists in such advanced fields as high-power lasers, magnetohydrodynamics, plasma physics, and artificial hearts.

Commuting between a house in Connecticut and an apartment in New York City, Ben also finds time for the lecture circuit. He is gifted with an easy platform manner and an ability to field questions deftly. Audiences ranging from the U.S. State Department to college campuses to international meetings of businessmen and scientists have been charmed by his insights on diverse fields leavened with humor. He is often accompanied by wife, Barbara, an author in her own right and a literary agent.

First becoming an *Analog* writer in the May, 1962 issue with "The Next Logical Step," Ben now has over fifty books to his credit. Closest to his heart is the highly thoughtful *Millennium,* available in Random House hardcover and Ballantine paperback. I think the book most expressive of Ben's bubbling sense of humor and Italianate enjoyment of life is his satirical *The Starcrossed,* whose original Vincent DiFate cover painting for the Pyramid paperback edition hangs over Ben's bed.

As fiction editor of *OMNI,* Ben won another Hugo at last year's world science fiction convention in London and shortly after moved to the magazine's top post as executive editor.

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THE TOUCH OF THEIR EYES

Any talent is potentially valuable– but not necessarily to its owner.

STEVEN GOULD

The classroom is small. The child is nine.

His classmates, aged ten, resent him. His teacher, aged fifty, adores him. He is the brightest of his class and, in his youth, flaunts it. On his chest flies the invisible order of "Teacher's Pet" with double oak leaf clusters. He hands his homework in early and it's never wrong. He answers every question correctly when called on. He is always first to finish the weekly exam.

He uses *five* syllable words.

So he was punished.

"Who can list the bones of the leg?" Miss Griggs (oh, how perfect a name, so stringy and wrinkled and humorless) was casting her hook into bored and sullen waters. The child, who had answered every question thus far, showed rare tact and remained silent. Or perhaps his throat hurt. Still, as the silence grew oppressive and Miss Griggs' eyes settled on him, he scraped back his chair yet again and stood to answer.

(There is a phrase common to westerns and spy thrillers. It goes, "Do you get the feeling we're being watched?")

A sensation never felt before crawled up the child's spine and gathered in a tight knot at the base of his skull. His mouth hung open and goose bumps covered his body. His answer and Miss Griggs' question vanished from conscious consideration.

They were watching him. As intensely as pinpricks, he felt each set of eyes upon him.

Miss Griggs prompted him. "The bones, Johnny?"

He didn't hear her. He didn't see her. The air moving across his skin went unheeded and the ever-present smell of chalk dust and disinfectant went unregistered by any part of his mind. All customary sensory impressions were drowned in the flood of this overpowering new sensation. Nothing but the acute awareness of other beings perceiving him reached his beleaguered brain.

"Johnny? Are you all right?"

The sensation increased as Miss Griggs' sharpened voice directed more of the class's attention at Johnny. Pinprick intensity became hypodermics stabbing deep. His knees buckled and he fell. When his head bounced off the desk edge, a lancing pain brought the most temporary of reliefs. Then, that

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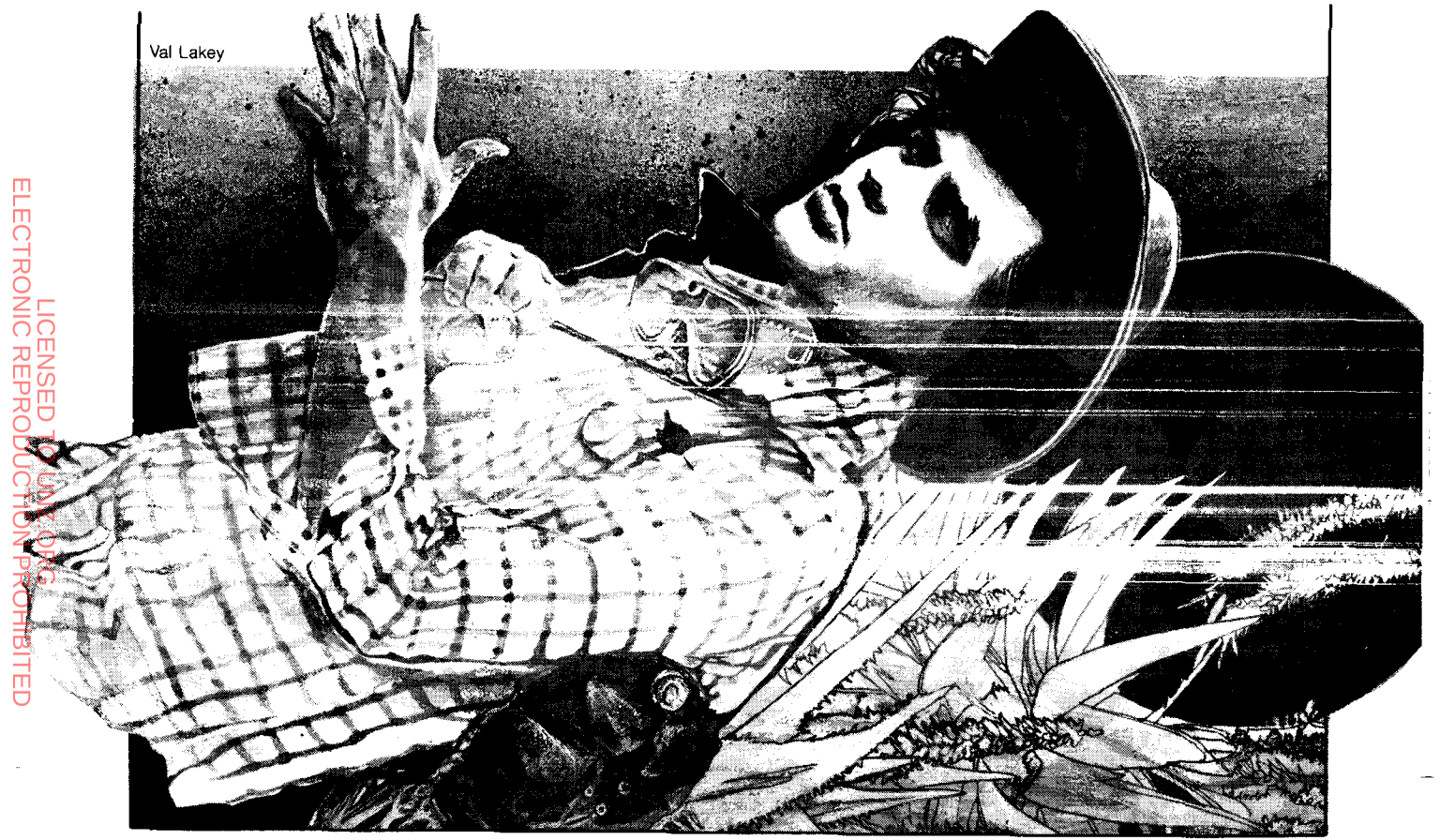

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welcome normality was smothered as the novelty of his collapse further increased his classmates attention.

He curled into a foetal tuck and started pounding his small fists against his head—anything to distract the intensity of their perception from his mind. And although he drew blood, he barely felt the blows.

His mind couldn't take it.

His mind *wouldn't* take it.

They carried him out on a stretcher still curled in a ball. A small, catatonic ball.

The classroom was small.

The child was me.

Out in the basin a trail of dust wound its way up the old ranch road. At each switchback a wineshield flung the morning sun up into the foothills at me. I shifted under the rock overhang and plucked an inconvenient pebble from under my leg. Limestone—upper Permian. I set it softly to the side.

The dust cloud resolved itself into a pair of Chevy Blazers. I cocked my head to one side and listened, but they weren't quite . . . no, there it was, a growl of low-geared effort coming up the last grade. I stood and moved quietly (always quietly) down the ridge to the end of the road.

Desolation is the face of the moon, the bottom of the Tonga Trench, the heights of the Greenland Ice Cap, and (in the minds of many mistaken people) a desert. Here I stood in the western foothills of the Delaware Mountains, a minor range of twisted rock running north-south in West Texas. It is also part of the North Chihuahuan Desert, a region whose major export is heat transported from its peaks and arroyos by constantly shifting winds.

I love it here.

My Toyota Land Cruiser had a Blazer parked to each side of it, I noted as I neared the flat stretch of gravel at the end of the road. I was stringing my way through a stand of mesquite, not trying to hide, but not stomping my feet either. Voices carried clearly from a group of people stretching the road-worn aches from their bodies.

"My God, what a horrible road!"

"Somebody give me a drink."

"I suppose this is our expert's car. Where is our expert?"

When I strode from the mesquite they were looking into the hills, down the dry stream bed, or at each other. None of them saw me walk up and lean against my Toyota.

In the sense of "we shall be three for dinner," they were six—four men and two women. They were dressed sensibly in boots, khaki, and denim. I hoped they all had hats.

One of the women pointed west. "What is that range over there?" Before the man beside her could unroll his map I spoke.

"Those are the Sierra Diablo, the Devil Mountains."

I didn't mean to startle them. Five of them whirled as if I'd lit a firecracker and the sixth one sprayed Coke across the ground.

"Speak of the devil, you must be Mr. Galighty." The eldest of them, a man of strong grip and greying hair, stepped forward and took my outstretched hand. "I'm Larry Narowitz, the head of this little group."

I recovered my fingers and smiled.

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"Glad you found the place."

"So are we. This is Tom Gamble, our geophysicist." A man of about thirty with blond hair and many laugh lines shook my hand. "And this is Robert Stahl, our seismic analyst." Another handshake, with a man about twenty-five. "Leslie Marshall, our interpreter, and Joe Lindquist, our bang man." Leslie had hair darker than a raven's wing, with the same iridescence in the sunlight. Lindquist was nondescript, somewhere between twenty-one and forty-one. Narowitz continued, "And this is Georgette whom everybody calls George Novosad."

"What do you do?"

She answered seriously. "What everyone else won't."

Chuckles all around.

"She's really our electronics tech," Narowitz explained. "But we made her leave her soldering iron behind."

"Good, I didn't bring any solder." I indicated a very large pile of truck-sized boulders up the hill. "Over there is a great deal of shade. If you'll carry your gear up that little trail, we can get started." I looked at the climbing sun. We would all be happier in the shade.

It wasn't as bad as I'd thought it would be. Like insects crawling over one's skin. A ladybug or two crawling down one's arm is distracting, but it is neither painful nor spellbinding. When they looked at me I knew it, but the knowing didn't disable me as once it would have. I might yet become a social animal.

Why did Lindquist spend so much time watching me while trying not to show it? I was not imagining the intensity with which he watched. Both women also focused strongly on me. They didn't try to hide it though. Maybe they were interested in me? Maybe Lindquist was gay? Maybe half the rocks in the Chihuahuan Desert belonged in my head.

"I am here because Danforth Geosource has been contracted to do oil exploration in remote regions of three North African nations. You're here because Danforth feels it's cheaper to keep a trained employee alive than it is to train his replacement. We have three full days to refine and test your desert survival skills."

"I thought you would be teaching us those skills," said Gamble, the geophysicist.

"Not in the sense of spoon-feeding. You will be learning by doing. Did you all read this?" I held up a medium-sized paperback, *The Hidden Water: A Guide to Coping In the Desert* by J. E. Galighty.

Nods from everyone.

"Good. As a literary effort it ranks just ahead of the Bobbsey Twins, but it will help keep you alive if you keep your head." I reached into a box and pulled out six small bags. "Take these and open them. The cup is graduated in milliliters. You'll find three pens in the notebook. Two of these aren't pens." I snapped open one of the plastic cases and showed them the glass rod inside. "They're thermometers. One's for ambient air and the other is for body temperature. If you look at the notebook, you'll see that the pages are set up for the hourly recording of both temperatures and the quantity of water con-

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sumed in that period. We'll also be weighed twice a day with a pair of scales I have in my Land Cruiser.

"There are two excellent reasons for all this rigamarole. First, it will give you an objective measurement of your body's reaction to dehydration and/or sodium depletion. Second, and most important, it will be good data for my next publication, tentatively entitled, *Dehydration: New Directions in Sadism*. This is the first time I've been paid by my subjects to experiment on them."

"Okay, Leslie, you're dying of thirst. The truck broke down three days ago and the radio is on the fritz. You haven't had a drop to drink since yesterday. Find some water."

It was the evening of the second day. An achingly beautiful sunset was smeared across half the sky, but I was the only one watching it. Leslie was marching determinedly up a gulley and the other five were right behind her. I stifled an urge to make them sit through the sunset and followed them up the old creekbed.

"Here," Leslie pointed at the lower edge of a bend in the stream where water would pool when it rained. Stahl and Gamble started digging with collapsable shovels. A meter down, the earth started getting damp.

They climbed out of the hole and George stepped forward with a rolled piece of plastic tubing and a large tin can. She seated the can in the dirt at the bottom of the hole and ran the plastic tubing from the can up the side of the hole and out. Then Leslie and Narowitz spread a two-meter square sheet of plastic over the hole and anchored its edges with dirt. Lindquist waited until they had both backed away before he set a small rock in the center of the plastic. It caused the sheet to dip sharply, forming an inverted cone over the can.

"See, condensation is forming already!" Leslie pointed to the beads of moisture forming on the underside of the plastic. After a minute, water started trickling down the cone and dripped slowly into the can.

I knelt beside the solar still and put the tube between my lips. I sucked gently and was rewarded by a slurping sound from the bottom of the hole. "Not bad. If you stuck to the same place, stayed out of the sun, and didn't exert yourself, two of these would keep one of you alive." I looked at them watching me with solemn faces. "Barely alive." They took in every word just as if I knew what I was talking about. I felt younger than my twenty-three years and pompous to boot.

Linquist was still a constant pressure on my turned back.

By my watch, the dawn was still three hours away. I counted bodies—six light sleeping bags spaced around a dying fire. Scorpio arched across the heavens and his earthly brothers slept under the warmest rock—or body—they could find. My pupils knew to check their boots in the morning.

Lindquist was finally asleep and so, it seemed, were the others. At least none of them was paying any attention to me.

Now if I could just say the same about the watcher on the hill.

He had been there since early afternoon and not always alone. I placed him near my resting place of the first day, where I'd watched Narowitz's party

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drive across the basin. His presence was a puzzlement.

The watcher's attention wandered. Every seven minutes or so, the pressure would go away to return shortly thereafter. I pulled my backpack closer and waited. After the next lull, I was putting my boots on in the mesquite while the watcher viewed my blanket-covered backpack.

I learned long ago, from a harsh and cruel necessity, to avoid the eyes of man. I drifted as a ghost would drift—unheard and unseen. (And who would know, better than I?) I stood on the ridge and looked down on them.

They were two. One slept beneath a tarp while the other looked into the bright green eyepiece of a starlight scope. Briefly, I considered a ghostly visitation, but dropped the idea quickly. Startled men do dangerous things.

Twenty minutes later I slipped undetected back into my bed. Sleep followed reluctantly.

"The other reason I say this trip is to polish your survival skills instead of to instill them, is because survival under *any* conditions is an art, not a science. The techniques one of you develops may differ markedly from another's without being any less effective.

"Still, there are definite parameters one must stay within. Avoid sunburn; it will incapacitate you as well as cause badly needed water to concentrate in the burned areas. Replenishing extracellular water and sodium is vital. If you lose too much salt due to sweat, your blood pressure will drop dangerously."

"Why?" Leslie was listening attentively. Everyone else seemed somewhere between polite attention and utter boredom.

"Okay, the salinity, actually the level of free ions in your intra- and extracellular fluids is always maintained at the same level. When the salinity on one side of a cell membrane increases, water is osmotically transferred from the low salinity side to the high side. When your blood plasma and other extracellular fluid is less salty than the cell interiors, water flows into the cells. Hence, blood pressure drops and you get dizzy, weak, or pass out. Carried far enough, your bodily functions can't make it and you die. This can happen with all the salt-free water in the world at your command."

Leslie nodded brightly. Everyone else nodded off. A snore came from Gamble's direction. I pushed on.

"The opposite occurs when you lose water, but not salt. The salinity in your blood plasma increases and the water starts leaving your cells and enters your plasma, lymphatic fluids, etcetera. In this case, blood pressure is maintained, but the cells start dying."

Leslie looked troubled. Everyone else looked asleep. I laughed.

"Consider that pre-Columbian Indians of this part of Texas enjoyed three times the leisure time of their brethren in water-rich East Texas. They not only found it possible to survive here, they found it easier!"

Although I once might have been classed as a mad dog, nobody ever said I was English. I sat under a tilted boulder, out of the noonday sun. Twelve meters away, under another rock, Lindquist pretended to sleep with his head

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pillowed on a pack. That he wasn't asleep was the reason I dozed fitfully. Try sleeping with a pair of cockroaches crawling up your side. The sensation isn't even similar, but the level of distraction is equivalent.

More eyes upon me and the crunch of rock from my right alerted me to Leslie's approach. I moved over to make room for her in the shade.

"Good day," said I.

"Good day," said she.

"Kipling had something to say about going out in the noonday sun."

"I have a question to ask, Mr. Galighty."

"As the youngest of any of you, I'd rather be called John."

"John, then, did you serve in Viet Nam?"

"No, I was too young and would've been 4-F. Why?"

"My brother was a Green Beret. When he wanted to, he could walk quieter than a cat. You walk that way all the time."

"And I don't even carry a big stick."

A flicker of annoyance crossed over her face and I got the feeling I wasn't taking her as seriously as she wanted.

"And who will you rescue today, Johnny Go Lightly?"

I winced. "You read the wrong newspapers, girl."

"I wondered where I'd heard your name before. It came to me just a few minutes ago. You located the Randolf family after no one else could find their wrecked plane. That's not so special. What got you all that attention was your reluctance to be interviewed or photographed. The *Houston Post* finally came up with that nickname after you'd lost their reporter for the twelfth time. What was that headline? Oh yes—'Who Was That Masked Man?' "

"I don't know what you're talking about. I wasn't in Texas, and nobody saw me." I scrunched down and slipped my hat over my face. "The Cessna would've been found eventually, but much too late."

"How'd you do it?"

I told her the strict truth. "I climbed the highest peak in the area and set off a smoke bomb. When they saw it, I knew where they were."

"Huh?"

"Never mind. Just dumb luck." In a not very subtle effort to change the subject, I pointed out into the basin. "The Apache came through there on their raids from Mexico." I raised the hat some. "I once guided an archeologist into the hills behind us and he asked me this question one night: Who do you think were the best light cavalry this planet has ever known?"

She looked thoughtful. "I would say the Mongols or the Georgian Cossacks."

"I suggested the Bengal Lancers, myself. I was wrong, too."

"Who were then?"

"The Commanche. If not for the advent of repeating firearms, they would have chased the white man out of Texas just like they did the Apache and Kiowa."

"The subject seems a far cry from oil prospecting."

"It depends on your perspective. When you see the Sahara, just try not thinking of Khartoum or Thomas Edward Lawrence."

"Who?"

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"You know, Larry of Arabia." I scratched my nose. "How long have you known the rest of the group?"

"We've been training for two months now, except Joe. The explosives man we had was transferred to the east coast two weeks ago for another company project. New hope for the Baltimore Canyon."

Two weeks ago I'd accepted Geosource's offer for this little exercise.

"Why were you 4-F?"

So much for subject changes. "Do you really want to know?"

"Yes."

"I spent seven years of my life in the Brentwood Hospital for the Insane. I was committed as a paranoid schizophrenic with little chance of recovery. After my release, I was a regular outpatient for two more years. I don't think the Army would have taken me."

Because eyes have such an effect on me I tend to notice expressions in terms of their movements. Leslie's grew large and she drew away from me. This hurt, so I laughed, "Don't worry, the only person that ever had to be protected from my tiny little arms was me."

"But how did you get your degree?"

"What degree?"

"I thought you at least had a masters in physiology or desert ecology. You publish in scientific journals, even *Scientific American*! You're one of the most literate persons I've ever talked to."

"Literate? Now there's the key. In England they don't ask you what you majored in at the university. They ask you what you read at the university. I was literate already at nine years old. Institutions are unpleasent even to the insane. Books are wonderful hiding places." I smiled. "I've received invitations to lecture at various colleges, but I've never attended one."

"I see," she said, though it was plain she didn't. "I better get some rest."

"Do that."

She went off to her place in the shade and I tried to get back to sleep, but the two imaginary cockroaches were still tap dancing up and down my side.

'Twas morning of the last day and trouble on the way. The watcher on the hill stopped watching and the wind came out of the northwest. Both were bad signs. The wind started at dawn and picked up velocity steadily. I put it at fifty-five kilometers per hour and rising. There was a darkening to the north and the topsoil took flight. I issued goggles and worried about flash floods.

I was getting nervous. Where were the watchers? Who were the watchers? My best guess put them as watchdogs sent by Geosource to insure the safety of their employees. While I was an established authority due to my publications, they knew nothing about my personal reliability. Still, I sounded weaker than sphaghetti under stress and I was entertaining other notions.

"Mr. Narowitz?" I spoke loudly. The wind was howling through the boulders and I had to repeat myself before he heard me. He finished a lashing on his improvised shelter and joined me by mine.

"Yes, Johnny?" They all called me Johnny since Leslie had told them of the plane crash and rescue.

"This may seem an odd or awkward question, but is there anything secret

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about your prospecting techniques or equipment? Say, something another company or country might be tempted to kidnap you or one of your technicians to get?''

''That is a strange question. Thinking of kidnapping one of us? Say Leslie?'' He smiled.

''For the last two days, two men have been keeping track of us from that ridge up there. Even to the extent of using a starlight scope at night.''

He looked convincinly startled. ''Are you sure?''

''Beyond a doubt. I took a good look the first night they showed up.'' I tried my next question. ''Are they connected with Lindquist?''

''How the hell should I know?'' He looked bemused. ''I really wouldn't be surprised. Are they still watching?''

''No, they quit about thirty minutes ago. Maybe to go away, maybe to do something else.'' I jumped up suddenly. ''Hey, no more cockroaches!''

''What?'' Narowitz regarded me with sudden distrust. Maybe he'd heard about Brentwood.

''Where's Lindquist?'' I scrambled atop the nearest boulder and straddled its crest. I saw nothing but a hillside covered with shale, mesquite, and lechuguia—that infamous succulent known as the punji stake of the southwest. That's all I saw, something else saw more. I felt my right side crawl with the perceptions of several persons. I faced that way, uphill. There had to be seven persons out there, hidden in the brush and rocks and looking at me. I turned and felt two more examining me from down the hill.

''I miscounted,'' I told Narowitz as I slid down the boulder and out of that dreadful crossfire of stares. ''We've got lots of company. Get the others!''

Blessed are those who ask no questions. He called them to him. As I'd already noted, Lindquist was gone.

''Grab water and follow me. This is not a test or an exercise.'' Their expressions varied from amusement to shock, mostly reactions to the look on my face. ''There are at least nine men converging on us. I haven't the slightest idea why, and I'd just as soon not find out.''

Scooping up canteens and hats, I led them at a careful jog through the boulder maze. In the rising wind, keeping quiet was not a problem. I stopped on the north edge of the boulders. In front of me was a stand of mesquite running across the hillside to a dry stream bed. I closed my eyes and concentrated, but felt nothing but the partial attention of those with me. We crouched and I put my hand on Gamble's shoulder.

''To the gulley and then up it, up the hill.''

He nodded and I slapped him on the back. He scrambled into the brush keeping low and watching his footing. I sent George and Stahl after him. They passed from sight.

Leslie and Narowitz moved up beside me. Narowitz was badly winded and he held his right hand over his calf.

''What happened?''

He uncovered a ragged tear in his pants leg. Blood oozed from a small puncture.

''Lecheguia?''

He nodded.

''You'll do fine. When you get to the top of the ridge, try circling around to the cars. Be wary of a guard.''

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"What will you do?" Leslie asked.

"I shall become very biblical and lead them into the desert."

Leslie protested. "That's stupid, Johnny. You could get killed! I'm going with you." All in one breath.

As the gods of logic didn't strike her dumb, I shook my head violently. "No, you aren't, because you'll be much too busy helping your boss up the hill." I looked her hard in the face and her eyes flinched. "You said it yourself. They call me Johnny Go Lightly and you'd only weigh me down!" I pointed out into the mesquite. "See?"

They both turned their heads and, swift like the wind, I was gone.

I exposed myself on the downhill side of the boulders. A long slope of shale extended down the ridge to an area of twisting arroyos carved by centuries of wind and water. I slid down it carefully, avoiding the Spanish dagger, prickly pear, and lecheguia scattered across the hill. Halfway down goose bumps danced up my back. I kept going.

An extra strong gust of wind made me look out into the basin. The Sierra Diablo were hidden behind a curtain of black, boiling clouds marching across the desert floor like a mountain looking for Mohammed. Lightning flashed across its face in jagged sheets. I thanked God for the goggles I had on and wondered if my pursuers wore them too.

At the first arroyo I turned and looked up the hill. Four men were scrambling down the slope after me. Three more stood at the top and watched with binoculars. They were all wearing fatigues. As I watched, one of the men slipped on the shale and slid in a violent tumble of flailing arms into a patch of lecheguia. I heard a sharp scream above the wind.

I winced. That was one man I didn't have to worry about. I dropped over the edge and into the arroyo.

Something slapped into my forehead. I felt the skin and brought my hand away wet. Soon, more fat, sandy drops of water fell. And the men behind me didn't have goggles. I sprinted hard down the arroyo.

The norther turned the sky black and made the ground walk. Gusts topping eighty klicks an hour flung mesquite trees through the air. The rain still fell sporadically, but I knew that tons of water were pouring on the peaks. Soon the floods would start.

I tried to edge further back into the hole I'd found on a raised hummock in the basin. The rain kept dripping on my legs.

Twice more, after I'd taken to the arroyos, I let them see me. Each time I led them further away from the hills. Then, I lost them thoroughly and looked for high ground. I hoped Leslie and the others were out of any water paths.

Well, what now, Johnny? Do you head for Ignacio's sheep ranch to the south and radio for help? Or do you carry the battle to the enemy? Who was the enemy?

One thing was certain. I wasn't doing anything until the storm abated.

Like Moses I had led them into the desert and, like Moses, I now left them and went to the mountain.

They were easy to avoid. I found myself able to tell when they were look-

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ing in my direction whether they saw me or not. There were now seven of them out in the basin and at least one more in the hills with binoculars.

It was late afternoon when I climbed back to the boulder maze. The clouds were gone and the sun strove to make up lost time. The rocks shimmered in the haze, dancing in the heat. I crouched under a rock and rationed myself a lovely swallow of water. In the sun, a meter long chunk of limestone seemed to blaze in the sun like the mantle of a gas lamp—white hot.

"Hmph," I muttered. "I'd like to see Moses get water out of *that* rock." I moved on toward the cars.

Five vehicles now sat in the wide gravel clearing. The two new arrivals were unmarked panel trucks with radio antennas. An awning had been stretched between them and canvas chairs set up in the shade.

The entire Danforth Geosource crew sat unguarded under the awning sipping canned soft drinks.

I moved closer through the mesquite thicket.

Lindquist looked into the opened door of one of the trucks and asked, "Any sign yet?"

A man wearing headphones loosely around his neck stepped into the doorway. "No, but they've lost another man to the heat. They put the two guys with the messed up eyes with him and left some water."

"Hell! Why didn't anyone think to bring goggles? Hadn't anybody heard of sandstorms?"

Narowitz and Stahl laughed out loud. George and Gamble smiled. Leslie just glared. "Why don't you call it off? You've found out what you want to know. Do you want to kill one of your own men trying to catch something that can't be caught?"

You tell 'em, Leslie.

Lindquist looked thoughtful. "How about it, Doc?" He called into the truck. A tall, redhaired man with thick glasses and a balding head stepped out of the truck and joined them. His name was Tom Case and he was the last person I ever expected to see in the North Chihuahuan Desert.

"I would love to call it off," said Case. "Who though, is going to tell Johnny?"

"Use a megaphone. Let me tell him!" Leslie on a rampage was impressive. "You don't need to capture him to communicate with him!"

"Oh? All the *Houston Post* wanted was a photograph and they got mad and spent much more time than the story was worth trying to get it. I have the feeling it will take capturing to talk with Johnny."

I circled until one of the trucks was between me and the awning. There was a window facing me, but nobody looked out of it. Quietly striding across the gravel, I slipped up beside the truck. Narowitz's voice came from around the corner.

"I knew Danforth carried many government contracts, but I didn't realize you wielded this much influence."

"Mr. Narowitz, we simply pointed out the advantages of survival training. At the same time, the Agency let Geosource know of our interest in Mr. Galighty . . . as a consultant, of course. I think it was quite kind of them to arrange my insertion into your crew."

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Lindquist sounded more confident than Joe, the explosives man.

"You didn't fool me one minute," replied Narowitz. "Your explosive techniques were more suited to demolition than to seismic signaling. I thought you were placed with us for intelligence work in North Africa."

"It wasn't a very long-term cover."

"No," I agreed, stepping around the corner of the truck. "It was a lousy cover."

This time I meant to startle. I was quite successful.

Lindquist, his chair already tilted back, went the rest of the way with a crash. Tom Case jerked back against the truck. Narowitz dropped his Coke and Gamble started coughing violently from inhaled Sprite.

"Mother of God!" exclaimed George as she sketched a hasty cross. Narowitz began pounding Gamble on the back and Case helped a red-faced Lindquist to his feet.

Leslie sat back in her chair and laughed and laughed.

"Did someone treat your leg?" I asked Narowitz as Leslie's peals of laughter died to suppressed giggles. Lindquist had vanished into a truck to recall his wandering warriors.

Narowitz smiled slowly. "I guess I forgot about it."

I knelt and peeled back the ragged flap of cloth. "Soak it in warm, soapy water. I trust you've had a tetanus booster lately?"

"Yes."

"Good." I stood and faced Case. "Tom, let's take a walk."

Memories from the halls of madness:

Cancer
dies with the patient
Heart Disease
dies with the patient
Huntington's Disease
kills on and on and on.

NATIONAL HUNTINGTON'S DISEASE ASSOCIATION

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New York, N.Y. 10018
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79-3

THIS SPACE CONTRIBUTED BY THE PUBLISHER

memories of the man—Tom Case.

He was a graduate student doing thesis work at Brentwood. There were several of them puttering about, giving tests to the patients and trying to make it with the nurses. The staff doctors regarded them as something to be endured and took delight in puncturing their tender egos. The staff particularly disliked Case.

We played chess once a week and, although we were evenly matched, I won a majority of the games.

"Why do I lose so much?" he once asked, more to himself than to me.

I started to set the board up for another game. "The reason you lose is simple. You pay too much attention to me and not enough to my pieces."

"I'm a psychologist, damnit! I pay attention to people."

"And you lose chess games you

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shouldn't."

He opened with the Ruy Lopez. "How do I stop it? If I knew when my attention was wandering, I'd be able to stop it. Obviously, I don't notice."

"Have you tried tying a string around your thumb? Who's the patient around here anyway?"

Halfway through the pawn exchange I said, "You're doing it again."

He froze with his hand halfway to the board. "You're right, but how'd you know?"

"You wouldn't believe me if I told you. Read my file." I put his queen in jeopardy. "Quit staring. It hurts and is going to lose you another game."

The next day he arrived in my room with a deck of cards and score sheet. The cards were divided into circles, squares, stars, triangles, and wavy lines. It was a test of my paranormal sensory abilities. I failed miserably.

"You're wasting your time, Mr. Case. I'm just another paranoid who thinks he knows when people are watching him. What you need is another Edgar Cayce."

He came back a half hour later. "Put this blindfold on for me, Johnny."

I eyed it with distrust. "Why?"

"Don't be such a cynic. Put it on." He checked the edges. "What do you feel?"

"What do you mean?"

"Like . . . how many people are watching you?"

I said without hesitation, "Three. You, someone on the other side of the inspection panel, and someone out the window." I tore the blindfold off. "Do you get your jollies from playing with the mentally disturbed? Please get out of my room before I call one of the staff and complain."

"Take it easy, Johnny."

"Stuff it. I've managed to build a secure and private nest in this hellhole and you're messing it up. I don't like people who stare! Get out!"

He left my room. Two days later, after a violent argument with the staff, he left Brentwood. He didn't come back.

In the shade of a tilted slab of rock we sat and watched the old creekbed dry up once again. I wondered how many times a year it guided water to the basin.

"So, Tom, when did you get your doctorate?"

"Last May."

"Amazing. I didn't know they awarded doctorates in bumbling."

He sighed and declined comment.

"How on earth did you get the C.I.A. to authorize this stupid jaunt?" I crossed my arms in front of me.

He laughed. "You'd be surprised what the Agency will authorize if the project is cheap enough."

"Cheap? The manpower you've tied up must be enormous."

"Not really. The assault team just graduated and were going on a field test anyway. We just shifted the site."

"They don't know much about the desert, do they."

"I guess not. Lindquist is permanently attached to my department and from what I'd heard, Geosource got their money's worth."

"Okay, that's how. Now, tell me why? Why do you want to trouble my sleep any more than it already is?"

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His eyes stared through me, but the brain behind them was elsewhere. I think he was considering what approach to take with me.

"First, will you listen and let me finish before making any decisions?"

I nodded. "Within reason. I'll give you five minutes."

"I work for an obscure little department the Agency has named Dark Hunter. We locate wild talents and identify, study, and come up with ways to utilize them. For example, we have a girl with the gift of sight. This may not sound like a big deal, but she lost both her eyes six years ago. She can describe the contents of a sealed safe at three hundred meters.

"She's our prize, the one we show visiting VIPs, but since I've worked with the section, I've located three probable telepaths, one possible telekinetic, two erratic precognates, and a person who knows for a fact when people are looking at him." He paused and sat back.

"You never belonged in Brentwood. Their diagnosis was completely wrong. I shudder when I think of the wasted years of your life."

"Don't bother. Electroshock therapy is a blast. I recomend it to all my friends."

"You don't have any friends."

"Oh, shut up."

Case went on with his pitch. "I was going to make you my doctoral thesis, Johnny, but something else came up. Still, Dark Hunter needs you. We wanted to test you."

"The last I heard, my telephone number is still in the book. Why didn't you just ask?" I was getting fed up and my voice was showing it.

"Did Johnny Go Lightly let a Houston reporter do something as harmless as take his picture? I'll bet you had your fill of tests and labs at Brentwood.

"Then there's another factor Dark Hunter has discovered. We have discovered several subjects that perform well in the lab, but fall apart under field conditions. They become useless for intelligence gathering purposes. By testing you this way, we've certified the effectiveness of your talent under stress."

"Whoopee."

"Good grief, man! You are the covert agent's dream. You've got eyes in the middle of your back and you can't be tailed. Here we set nine trained men on your trail and you lose them in the blink of an eye. We need you!"

"Are you through?"

"Except to say the pay is good and you travel well."

I looked up at a red-tailed hawk riding the thermals above us. He looked content in his corner of the sky. I wondered if I would ever find mine.

"Tom, let me tell you about my recurring nightmare. It goes as follows. It's dark and I'm tied to a chair and I can't get free. Still, I struggle, because I know that if I don't break loose something terrible is going to happen. Then the lights come on and I'm sitting in the middle of the Houston Astrodome. I usually wake up before all the seats are full, but I'm usually screaming." I shivered involuntarily. "I will not work for you, I might find myself waking up in that chair."

I got up and walked down the hill.

"I want to see you again."

"I was afraid of that."

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"Am I so repulsive?"

"You know better."

Leslie, with an inch of vibram soles, came up to my chin. She looked up at me with great soulful eyes. The intensity of her gaze gave me shivers that were not altogether unpleasent. The Danforth Geosource team waited impatiently by their cars, and the battered assault team was struggling up the ridge.

Leslie brushed back a strand of hair. "Why are you afraid of me?"

"Did they tell you anything about me?"

"A little. You know when people are looking at you."

"Or hearing, smelling, touching, tasting, or perceiving me in any fasion whatsoever. And the stronger they perceive, the more I feel it." I felt an overwhelming loneliness steal over me and the pesky wind was making my eyes water. At least a tear slid down my dusty cheek. "You are taken with me—I can feel it. You focus your attention on me as the lens focuses light. I'm like a plant. I need the sun, but when you focus it on me, I burn. I find extreme attention very distracting and even painful."

She lifted a wondering hand to the streak of water on my face. My heart nearly stopped.

"Will you ever be able to take it?"

"I'm getting better all the time."

She dropped her hand. "My tour in Africa is over in seven months." Without another word she turned and walked back to the Geosource group.

I climbed shakily into the Toyota Land Cruiser and hastily started the engine. Leslie was only halfway to the Blazers as I drove down the road and mercifully out of sight of everyone behind me. A great load eased off my shoulders and I began conditioning myself to being alone again.

Out across the basin, the sun dropped below the Sierra Diablo. Cursing softly to myself, I drove off into the sunset . . . dammit! ■

IN TIMES TO COME

Our October issue offers an intriguingly mixed bag of fiction and non-fiction. Vincent di Fate's cover is for "Moment of Inerita," by Charles Sheffield, skilled in a kind of "idea" science fiction too seldom seen these days. The concept is a dilly. The long travel times required for space voyages are imposed not so much by limitations on speed as by those on acceleration—the human body can only stand so much. But there may be a way around those limits, using things we already know about . . .

Steven E. McDonald has another, quite different, "idea" novelette—"Ideologies" We all know that it's highly desirable to obtain, say, cheap aluminum from the moon, cheaply processed in obriting factories. But how does it look to somebody who lives in a struggling country whose only important export is bauxite? You may find it disturbing and thought-provoking—when seen through those eyes.

We'll have two shortish fact articles, one fairly "typical", the other distinctly unusual—and fun. John Gribbin's "Galaxy Formation" is just what the title says, but it includes some recent findings which may radically change our ways of looking at that subject Donald G. Carpenter's "The Physics of Haunting" is a speculative piece singularly suited to October—but he's looked at the problem rather carefully, and you may find his conclusions intriguing.

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THE REFERENCE LIBRARY

BY TOM EASTON

Beyond the Blue Event Horizon, Frederik Pohl, Ballantine/ Del Rey, $9.95, 327 pp.
Golem 100, Alfred Bester, Simon & Schuster, $11.95, 384 pp.
The Last Immortal, J. O. Jeppson, Houghton Mifflin, $9.95, 278 pp.
Scavengers, David J. Skal, Pocket Books, (no price given), 169 pp.
The Catalyst, Charles L. Harness, Pocket Books, $1.95, 191 pp.
Shadow of Earth, Phyllis Eisenstein, Dell, $2.25, 329 pp.
The Gates of Heaven, Paul F. Preuss, Bantam, $1.95, (no pages).
Chrysalis 6, Other Worlds 1 & 2, Roy Torgeson, ed., Zebra, $1.95, $2.25, $2.25, 285 pp., 282 pp., 281 pp.
Aliens!, Gardner R. Dozois and Jack M. Dann, eds., Pocket Books, (no price given), 270 pp.
The Fifth Book of Virgil Finlay, More Fantasy by Fabian, edited and published by Gerry de la Ree, 7 Cedarwood Lane, Saddle River, NJ 07458, $15.75, 128 pp.

Three years ago, Frederik Pohl published the award-winning *Gateway*. Set in a world of crisis, like many current SF novels, it concerned the race to find and exploit artifacts left behind by the vanished Heechee, an alien species of immense technological prowess. The key was a Heechee space station, Gateway, still equipped with faster-than-light ships. No one understood how to control the ships, though. Those who rode them on the treasure hunts rode blind. They might or might not return. They might or might not get rich. But for all the risks, the potential rewards were great and there was no dearth of volunteer prospectors. One was *Gateway*'s protagonist, Robinette Broadhead, who struck it rich in a big way.

Now we have *Gateway*'s sequel, **Beyond the Blue Event Horizon,** a title that does not become clear before the end of the book. Broadhead is again involved, this time as one of the financiers behind an expedition to a Heechee installation in Sol's comet cloud, a Food Factory devoted to turning cometary matter into food. The mission is to bring the Food Factory to Earth to feed the starving billions. The expedition is staffed by an old German (with memories of Hitler's youth corps), his two daughters, and his son-in-law. They reach the Factory, encounter problems, and meet a mysterious boy who leads them to another installation, Heechee Heaven, occupied by mysterious aliens. Meanwhile, back on Earth, Broadhead is coping with the fifty-day communication lag between him and the Factory, with legal problems, and with the reassembly of his wife, nearly totalled in a bus crash caused by a mysterious influence emanating from the Factory. He does all this with the aid of a series of marvelously lifelike computer programs (a science program is named "Albert Einstein") written by his wife. When the expedition is captured by the aliens, he ships out to Heechee Heaven to rescue them. He succeeds, of course, and in the process learns enough of the Heechee secrets to end the book on a note of high optimism. The book's final scene warps that note, though, for it involves the Heechee themselves.

On reading *Horizon*, one might think Pohl has resolved all the mysteries

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posed by *Gateway*. He has, and in that sense he has finished the story. But, in that final scene he poses an even greater mystery. I don't know whether he plans to deal with it in another book. If he does, it should be a cosmic blockbuster. *Gateway* won the Hugo, the Nebula, and the John W. Campbell Memorial Award. *Horizon* may do the same. And so may that blockbuster. So far as I know, that will make a first in the history of SF: three books, in series, that cop all the awards in reach. The Triple Crown is nothing.

What is Pohl's secret? Every writer in the business must want to know. I'm no exception. And I'm not sure I can answer my question in any helpful way. Imagination comes into it, of course. Pohl is gifted well beyond the ordinary with the ability to conceive novel ideas, to assemble them into rich packages, to add in ideas contributed by others, to make them fit together in a way that lets his vision simulate the real world in complexity of texture and interrelatedness. I hate to use buzzwords, but I must call that vision holistic and integrated. Character comes in, too. His characters are real, and they fit niches in Pohl's world just as real people do in reality. There is little sense that his creations are ruled by an author. And then there's the science. Pohl's Earth has a logically extrapolated science and technology. Faced with alien mysteries, his people display understandable frustration.

Why is all this so prizeworthy? To put it baldly, Pohl's skills are those all writers pray to achieve. Just as baldly, most SF is more skeletal, less consistent, and less verisimilitudinous. Mainstream literature, on the other hand, even the popular variety such as the *Airport* genre, tends to be more whole. It is intriguing to think that perhaps Pohl is growing out of SF into the mainstream, even as some mainstream writers are picking up SF ideas. There is a rapprochement coming, a blending that will make the two areas indistinguishable. Insofar as it succeeds and comes to dominate modern literature—and I believe it will—I think it will be largely owing to Pohl and his like. They know the SF field, and they avoid the cliches and scientific gaffes that so plague the mainstream writer moving into SF. As they convert mainstream styles and approaches and artistic criteria to SF applications, they will invigorate the field beyond anything we have seen before.

Sound familiar? It *is* what the New Wave once claimed. But they were more concerned with redefining SF and technique than with competence. Pohl—and too few others over the years—have stressed the crucial importance of competence, of making stories whole and complete and alive. It then matters very little whether they choose to treat "classic," high-tech SF themes or "modern" ones.

Like Pohl, Alfred Bester is one of SF's better authors, an imaginative and poetic creator of original visions. We all look forward to his latest, and we are never disappointed—unless we have built our hopes too high. This time, his latest is a fantasia in two media: **Golem 100.** The world is a dismal future of too many people and too few resources. The characters are an East Indian policeman who can join the ranks of Stout's, Christie's, Creasey's, etc., creations any day; a perfume-maker's Nose (perfumes once again compensate the odors of the rich unwashed—water is rationed); a Black Beauty who gains her wealth as a syncretic troubleshooter cum private eye; and eight ordinary, crazy ladies whose weekly witchcraft sessions raise a devil from our species' collective unconscious, the Phasma-

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world. All come together when the Nose starts following death wish pheromone trails, the policeman is faced with a series of bizarre murders, the Nose's employer puts Black Beauty on the trail of whatever is blocking the Nose's nose, and a rare-earth clue leads to the ladies. The PLO, successor to the Mafia, gets into the act, as do a necrophiliac and assorted others. Black Beauty and the Nose identify the nature of the problem and seek it in a drug-induced trip into the Phasmaworld, a realm where perceptions can only be presented as a series of visual symbols, pictures, inkblots, and alphanumerics. Whole chapters so presented lend a dimension of reality to Bester's prose and an air of inevitability to the conclusion.

Does it all work? I can't say I was able to suspend my disbelief, but the tale *is* a romp, a dance of absurdity, improbability, nonsense, and laughter. I enjoyed it greatly.

When Isaac Asimov created the Three Laws of Robotics, he also defined the terms in which anyone else must thereafter think about robots. There have been and are exceptions, of course, but even they show an awareness of the Laws, if only by the care with which they avoid them. One might expect that if any member of Asimov's family were to write SF about robots, the Laws would play a prominent part, conspicuous either by their presence or absence.

'Tain't so, McGee! J. O. Jeppson is Asimov's wife (it says so right here on the jacket). She has written a novel in which robots play a central role, and—far from being constrained by the Three Laws—her robots might as well be human. Immortality is their only distinctive trait. They are perverse, emotional, sensual, and sexy. They can even kill.

The Last Immortal's central character is the robot Tec, created by the dragonlike Roiiss before the last Big Bang and brought by them across the barrier of creation into our universe. Once a gardener, he is now a friend to humans, a donor of new technology and of the Roiiss virus that gives humans telepathy. Bored with his long existence, he requests termination but is put into stasis instead, to be awakened eons later when humans are preparing their own trip through a black hole to a new universe. The novel is the story of his relationships with humans, with the intelligent tortoise Samyak, with the dream-selling Pedlar, with the mystery man Yodin, with the equally mysterious York, and with the last of the Roiiss. It is a tale of increasing humanity, of intelligent galaxies, and of *Götterdämmerung*. It is cosmic stuff, marked by an unsurprising understanding of human nature (Jeppson is a psychiatrist). It is space opera far more literate than Doc Smith's romps. *But*—I was disappointed by it. The reason? Perhaps the robots are too human; but then if we ever do build intelligent machines, won't they behave much as we do ourselves? Isn't that the whole point of the Turing criterion for machine intelligence? The problem lies in Jeppson's prose, for she gives it a paucity of humor and a surfeit of clinical detachment. It seems as mechanical as her robots are not at times. It fails to *live*.

David Skal's **Scavengers** is a strange book. It posits a future in which a scientist has learned how to extract the chemical basis of memory from the brain. This extract, moreover, can be injected into a person to give spurious, temporary memories, memories so vivid that one can seem to live the memory-donor's life, to *be* the donor. If you are a human drone, leading a life of boredom and drudgery, and the extract is

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from the brain of some vital, creative person, you can experience a high like no drug can give. Unfortunately, your high, your "brainstorm," requires the death of the donor. The extract is made by decapitation, homogenization of the brain with a blender, and so on. One brain can provide a thousand hits.

So much Skal offers as a given. In his world, it is not safe to rise above the herd. If you do, you are all too likely to be tapped as a donor by the underground Church of the Extended Mind, whose goal is shared experience. The cost, they believe, is negligible compared to the benefits. It is hardly negligible to the victim, though, even when the victim shares the Church's credo, as did the artist Kelly. She got tapped. Her would-be lover, Brian, a neurotic/psychotic art restorer, searches out as many as he can of the hypos containing her extract and kidnaps a young brainstormer girl, Tracy. She is to be the receptacle in which he tries to recreate Kelly. He believes that a large dose of extract will let Kelly's persona take over Tracy's mind and body.

The story is told in alternating voices, Brian and Tracy revealing their thoughts and histories. There are puzzling intrusions that rouse the questions: Are personality and identity wholly a function of memory? Taking the extract allows you to experience the donor, but does it also allow the donor to experience you? What would the donor experience? Would its brief reincarnation seem a macabre, tortured, fragmented imprisonment? The body is so different, after all. The donor personality has to know what led up to this brief spasm of existence. Is joy for the brainstormer a new form of hell for the donor? Can it be anything else?

Skal answers these questions successfully. He involves you, hurts you, makes you suffer with his characters. He offers little joy, little "enjoyment," but he is still worth reading. Enough so that I am giving **Scavengers** one of my Nebula recommendations.

Charles Harness's latest is a neat example of the dictum, "Write what you know." Harness himself is a practicing patent lawyer. So is the protagonist of **The Catalyst,** Paul Blandford. If the dictum goes beyond that, we can conclude Harness has had dyed-in-the-wool schmucks for bosses, for a fair portion of this book's appeal is in its several answers to the question of what variants on the plagues of Egypt can you come up with for such a boss—an example: you use his ex-mistress to obtain a sperm sample, use it to fertilize a gibbon egg, grow the embryo in an aquarium-cum-artificial womb, and then expose the embryo to a plague virus in order to test a new wonder drug; along the way, word gets out and the oblivious bossman is gifted with box upon box of execrable cigars.

Is that puckish humor? Whatever, it isn't the real story. That concerns trialine, a wonder chemical with potential for fabrics and drugs, and the wonder chemist Johnnie Serane, the spitting image of Blandford's late brother. Serane has a gift for provoking loyalty and creativity in the scientific misfits assigned him by a jealous management. His research group is a cornucopia of patents, but even so he is eventually fired. On his last day, he gets the idea for the catalyst needed if trialine is to be made economically. It falls to Blandford to test the idea, making the catalyst from ingredients I shouldn't reveal. It works, the patent is filed, and Serane is vindicated, even though his boss only gains more power.

Harness writes well, even charmingly. He gives the impression that his

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heroes and heroines are favored by the gods and their lives, successes, and happinesses are guaranteed by some cosmic warranty. Setbacks are compensated. Ejection from one niche only reveals a better niche, and no effort is needed to change jobs. The favor seems to flow from Serane's role as intellectual catalyst and Blandford's brother's role as spiritual catalyst. And the favor lends the book at least some of its charm; Harness feeds everyone's dream of happy destiny without being offensively obvious. I recommend this book to you. I expect you'll enjoy it.

For all that Phyllis Eisenstein is a friend, I can't give her the kudos she would surely like. At least, not this time. Her **Shadow of Earth,** like many another novel, is science fiction only by courtesy of the "alternate worlds" premise. Otherwise, it is a historical novel, and not a bad one either.

A physics graduate student discovers a gate into another world, one where the Spanish Armada defeated England in 1588, Spain came to rule the New World, and Catholicism successfully stifled all technological advance until the present. This ignores other reasons for Spain's decline (the expulsion of the Jews a century earlier may have been as important as the defeat by England), but to the story. Spanish settlers live near our world's Chicago and fight Indians and each other with flintlocks. The grad student sees an opportunity to get rich by running modern weapons through the gate and does so. He also runs Celia, his girlfriend and Spanish tutor, through. She is marooned there, sold as a slave to a wandering troubador, and sold again as brood-wife to a nobleman. Her experiences give Eisenstein the chance to weave a rich tapestry of medieval life in a novel setting, of squalor and female chattelry. She uses it to emphasize the advantages women enjoy in our own world, for all its imperfections, and to stress her heroine's alienation, a theme brought out very effectively when Celia finally returns home with her troubador lover and it is his turn to be the stranger.

One of the great SF questions is "What if . . . ?" Well, if alternate worlds exist, the story of their discovery and initial exploitation might well go something like this. Eisenstein is a good writer, with effective command of the language and the feelings it can express. She gives her story an air of reality, that makes it eminently readable. But I doubt you'll enjoy it unless you like historical fiction more than SF.

Paul Preuss' **The Gates of Heaven** is coincidence-happy. Picture it—years before the story, the *Actis* leaves Earth's LaGrangian colony in defiance of the orders of an isolationist government. Its mission is to capture an asteroid and use part of the asteroid's mass to fuel its return to Earth orbit. However, something goes wrong with the engines, and ship and asteroid together hurtle out of the solar system, only to be sucked into an unsuspectedly nearby black hole. At the time of the story, a Cyclops-like antenna array, scanning the sky in a search for intelligent signals, fixes on Tau Ceti just in time to pick up the *Actis*' distress cries. The ship and its people survived passage through the black hole and are about to set down on a habitable planet. At the same time, a half-qualified, unmotivated mathematician gets an unlikely bright idea: perhaps the black hole's peculiar behavior can be explained if it is really a *pair* of black holes orbiting each other and supplying each other with energy so that their interaction does not flood the solar system with x-rays. Perhaps the *Actis* was not destroyed because

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there is a safe path between event horizons and it just happened to hit it. An expedition to the black hole soon proves the theory right, and more. There are *many* safe paths and many unsafe ones. The *Actis* indeed happened to pick a good one and so reveals Earth's gateway to the galaxy. Each safe path has a different destination, and each such destination offers a return path. With this discovery, the expedition plunges through to Tau Ceti to find and retrieve the *Actis* survivors and claim a new world for Earth's teeming millions.

Now, Preuss' black hole strikes me as having a highly unstable, improbable arrangement, and the idea of exporting population problems was debunked long ago. That aside, the story itself is far too neat for my tastes, even though the above sketch is the merest skeleton of a story that has much more to do with political wrangling, conflicts of desire and priority, and the questions of fate and freedom. Coincidence serves fate, Preuss seems to say, and I suppose he's right. But is there really no such thing as individual freedom? Must the individual surrender privacy and accomplishment to the public weal? Are the hardy pioneers, proud in their self-reliance, doomed?

Or do I miss Preuss' point? He has several self-reliant characters. They accomplish wonders. *But* they are not allowed to keep the fruits of their labors, at least not in the Campbellian sense of the man-who-can who founds an industrial, financial, or social empire out of his drive and competence. Perhaps Preuss intends one or more sequels in which Earth's powerful government fades or is left behind and men-who-can are free to accomplish. There are hints to this effect, and *Gates* offers a fine launching pad for a series of such stories. However, it could also serve to launch a series with the converse theme of subordination.

Either way, Preuss is a writer to watch. His prose is clean and effective, his characters real, his emotions feelable. His story lives more vividly than many, and if his theme fails to agree perfectly with the reader's prejudices, that is no reason to avoid him. How else can one's mind be broadened?

I once said that the *Chrysalis* anthologies resemble issues of a magazine. With **Chrysalis 6** now out, it seems the editor, Roy Torgeson, agrees. In his Introduction, he says, "*Chrysalis 6*, like its predecessors, is an eclectic volume. That is, the stories are not bound together by any particular theme, style, mood, etc. Their only common bond is that I think they are *good* stories." They are, too. *Chrysalis 6* seems to be the best volume so far. I particularly enjoyed Rick Wilber's "Horatio Hornblower and the Songs of Innocence," in which involuntary colonists are shipped out in suspended animation with dreams to keep them sane. One colonist, condemned to the fifty-year voyage for the crime of reading proscribed books, volunteers to provide the dreams by reading bits of Blake, Milton, Shelley, Forester, *et al.*, every day for the full half century. The result is satsifying. There is also Stephen Goldin's "Apollyon Ex Machina," a sympathetic view of a robot's Angel of Death; and Karl Hansen's "The Burden of Their Song," a moving study of interplanetary racing in a context of human bioengineering, neuropeptide drugs, and the strange beings—sirens, lamia—that live eternally beyond Pluto. There are more, too—readable, enjoyable tales by Tom Monteleone, the late Ward Moore, Lafferty, Malzberg, and others. Don't miss it if you like short fiction at all.

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Also edited by Torgeson is a series of fantasy anthologies. I have **Other Worlds 1** and **2** before me now, and they're well worth having a look at, folks. In fact, they strike me as rather better than the early *Chrysalis* volumes. *OW1* is remarkable enough for Orson Scott Card's "The Bully and the Beast," a tale of a strong giant, a lovely maiden, a dragon, and truth; but it also contains "Water Kwatz, or More Bible, Suckers," by R. A. Cross, which I read even as Southern California seemed to be vanishing beneath its 1980 floods. *OW2* is most memorable for Pat Murphy's "Don't Look Back," a twist of *déjà vu*, and Avram Davidson's "There Beneath the Silky-trees and Whelmed in Deeper Gulphs than Me," a tale of jungle strangeness and jumble horror in British Hidalgo. Both volumes contain excerpts from Poul Anderson's forthcoming historical novel, *The Last Viking: The Saga of Harald Hardrede*, which may not, on the strength of these samples, quite measure up to his *Hrolf Kraki's Saga*.

The public image of SF is a montage of rocket ships, spacesuits, star wars, strange worlds, and stranger beings. That last item may even be the dominant element in the montage. BEMs, extraterrestrials, aliens, all are a hallmark of the genre. Every writer in the business has dealt with them at least once. A few writers have even dealt with them freshly, managing to avoid cliche and stereotype and examine how strange relationships might affect and even enhance humanity. These are the stories Gardner Dozois and Jack Dann sought when they assembled their anthology **Aliens!** They succeeded, for the book is a pleasure. It restores to our hands such gems as Pangborn's "Angels' Egg," in which a man's hen hatches an egg that contains an endearing, promising alien; Tiptree's "And I Awoke and Found Me Here on the Cold Hill's Side," in which aliens disrupt human behavior by providing supernormal stimuli (sexier than sexy, for instance); and Budrys' "Be Merry," in which shipwrecked aliens infect and are infected by Terra's humans, yet bring their own solution. There are more, too, and they are all worth attention.

Gerry de la Ree has given me a rare opportunity to compare past and present in SF and fantasy illustration. For this column, he sent me copies of **The Fifth Book of Virgil Finlay** and **More Fantasy by Fabian.** Finlay enjoys a reputation for surpassing excellence, for painstaking technique and attention to detail. *Finlay 5* tries to document this with a collection of his work from the pages of the old *Weird Tales*, from 1935 to 1954, when the mag folded. It is successful in that it amply displays the man's use of stipple and line, a technique that suffers more than most from poor reproduction. However, it also makes clear Finlay's predilection for melodrama, for overstated, stereotyped scenes, facial expressions, and poses. This may have been less of a drawback at the time, and it may in fact be why Finlay's reputation survived poor reproduction of his work—there were few subtleties to be lost, and the melodrama meant easier communication. We live in a more subtle age today, though, and the *Fabian* reflects this. Fabian's work incorporates its share of melodrama, as must be natural enough in illustrating sword-and-sorcery tales, but there is a much stronger note of calm, peace, containment, a sense of dream instead of nightmare. Both books are well produced, well organized, and attractively designed. They are limited editions (1350 copies of the *Finlay* and 1300 of the *Fabian* were printed), however, so if you want to buy, do it now. ■

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BRASS TACKS

Dear Mr. Schmidt,

Just a quick note to toss over to you an idea I've harbored for some time—but an idea which, for all I know, may have been presented to you, Mr. Bova and even Mr. Campbell with monotonous regularity, month in, month out.

I started reading ASF, when it was still Astounding, in the mid 1950s, at an early age. My reading of science fiction generally, which was very wide in the 50s and 60s, tapered off last decade and Analog is the only magazine in the field I regularly buy.

My idea is simply this. Bookshops are crammed with anthologies of this and that, but Astounding-Analog is, to my mind, too important to be carved up this way. Anyway, the definitive Astounding anthology, "Adventures in Space and Time," has been done.

What's needed is a reprint program of the source itself. Of Astounding, beginning from 1938 (more accurately, late 1937) when John W. Campbell Jr. took over editorially from Harry Bates and created science fiction as we know it.

This could take many forms. I would suggest, using offset reproduction of the original magazines, issuing over a period of time, printed on lasting quality slick paper (to keep thickness to a minimum) reprints of say four complete magazines per volume, sturdily bound in thick paper covers, with each magazine having its original color cover reproduced. The general effect would be of a bound set of Astoundings, with the reprint run initially taking us up to when Astounding changed over to Analog in those few metamorphosis issues.

Such a project would be, of course, expensive. So my idea would be to issue them along the lines of a book club, with subscribers taking, say one volume every two months or three months. Reprinting every two months, four issues every time, would be a three-year project—major, but not insuperable. Bookshop sales would, I believe, be popular—but subscription would be the bread-and-butter method of getting the project off the ground.

We are looking at reprints of magazines published between 42 and 22 years ago—in that time a whole new generation has grown up which would, I believe, respond eagerly to the chance of building up a definitive ASF file.

Perhaps you could broach this idea through the magazine, to guage reader reaction.

Technology being what it is, an alternative method would be simply to have the entire ASF file available, in storage form, on video disc for replay, page by page, through the video disc machines now marketed. However, nothing will quite replace the feeling

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of having the magazine itself in your hands. No anthology has yet done this; I believe a reprint program of the sort I suggest will.

It could of course be done in stages—reprints of 1930 to 1950 to test the market, followed a few years later by the 1950s. I hope you find this proposal, in part at least, worth investigating further.

ANTHONY CLARKE
126 Harcourt St.
Hawthorn 3123
Melbourne, Australia

I'm not sure how viable this would be, but it happens that a "trial balloon" is already in the works: a hardcover reissue of the July 1939 Astounding. That should give us some idea what we might expect—and, of course, we welcome your expressions of interest (or lack thereof).

Dear Mr. Schmidt:

Professor John Ahrens, in his farcical editorial (May 1980) about energy, says "Consider...the economics of conservation...Conservation is not doing without." Mr. Ahrens may be one heck of a philosopher, but he sure as hell ain't no economist!

Let me outline some of the measures I have personally employed in our "war" against energy waste, and their cost:

a. I had my house built as "double-wall" construction, though the state building code only called for single-wall.
b. I had extra insulation installed, to R-38 standards in the attic; code calls for R-19.
c. I had the garage insulated and finished-walled to shortstop heat loss.
d. I had storm windows and storm doors installed throughout the house.
e. I recaulked all windows and doors, and re-sealed all outside wall openings.
f. I substituted fluorescent lights for incandescent bulbs in much of the house.
g. I instituted a regimen of turning off our hot water heater for some 22 hours a day.
h. I insulated the hot water heater.
i. I installed flow limiters in all showers, tubs, and faucets to limit hot water flow.
j. I have adjusted the heating thermostat so low that now my brass monkey on the mantel sings in soprano!
k. We now plan our cooking days in advance, cooking several meals at once in order to make maximum use of a hot oven. We freeze the cooked food and later warm it in a microwave oven after ambient thawing.
l. I vented the clothes dryer heat under the house in winter to warm ground level floors.
m. I installed automatic switches on outside lights in case I forget to turn them off in the mornings.
n. Et cetera, et cetera, et cetera, ad nauseum.

These items cost me more than $3,000 out of pocket. I'm 100% disabled, not employed, making not enough money to pay taxes, so I get no rebate for this outlay. Believe me, these dollars were like drops of blood!

My reward for all this public spiritedness has been that the electric company raised its rates four times in the last year. I use some 30% less power, but my bills are some 50% higher.

You can see why I disagree about "not doing without." We are. And it hurts. Please ask Mr. Ahrens to tell me again about the economics of conservation. I must have missed some-

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thing the first time around.

Or, was that article your April Fool joke for the year?

WALTER E. MURDOCK
Lcdr., U.S. Navy
(Retired)

POSTSCRIPT: I have a similar horror story about my car and my efforts to help save gasoline, but I'll wait for your upcoming (?) article about the economics of gasoline conservation to write about that...

Dear Mr. Schmidt:

Without drawing the long bow for either Dreadful Ungodly Nu-Cu-Lar Power on the one hand, or generating energy from the fermentation of field mouse manure on the other, I would like to quote a couple of the Soft Energy Gurus. I did not see this directly in their works (printed on recycled paper, no doubt) so they may be out of context...

Dr. Lovins: "It would be little short of disastrous for us to discover a source of cheap, clean, abundant energy because of what we might do with it. We ought to be looking for energy sources that don't give us the excesses of concentrated energy with which we could do mischief to each other."

Prof. Paul Ehrlich: "Giving society cheap, abundant energy would be the equivalent of giving an idiot child a machine gun."

It is possible, that like the famed Iranian militants, these ayatollahs of the Soft Power business would note demolition of polluting power plants and scale their demands up to other sources, eventually wiping out small local power plants and going back to non-polluting animal and slave power.

Hard to tell which is worse; those who do not know where to start, or those who do not know when to quit.

Has anyone written in the science fiction pubs about the "Oklo Phenomenon," in which the world's first atomic pile existed in nature millions of years in the past, producing several thousand pounds of plutonium ere Dr. Seaborg "invented" it, and going down to a natural cold shut-off ere man discovered the lever?

JOHN P. CONLON
52 Columbia St.
Newark, OH. 43055

Or, for that matter, might those animal remains you fuel your car with include ancient chauffeurs—or ayatollahs?

Dear Mr. Schmidt:

I am accustomed to reading uninformed comments on nuclear power and electric utility operations in the newspapers and non-scientific oriented publications, but I did not expect it of Analog, particularly as a guest editorial. Your May, 1980 (Vol. C#5) guest editorial by John Ahrens is such a mass of errors and untruths that it deserves reply. I won't comment upon nuclear technology from the engineering point of view. I'll leave it to Jerry Pournelle and the scientists and engineers to handle that part. I'll just address the areas in which, as a professional consultant on electric utility costs and rates and expert witness in electric utility rate cases (5 years of experience including appearances before regulatory commissions in the U.S. and Canada), I have demonstrated competence.

First, *the Government* (Federal Government) does not regulate utility rates except wholesale (sales to other utilities) rates. Retail rates, the rates you and I pay, are regulated by state commissions. Second, rates do not guarantee a profit. Historical cost

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regulation, the *only* method used to set utility revenues, is based on a test year—almost invariably a past year. Thus, inefficiency in current operations directly impacts profits. There are no profit guarantees, merely an opportunity to achieve an authorized return. Third, the "profit" referred to in the article must cover all capital (rate base) related costs including depreciation and interest. What is actually done is to determine a fair return on stockholders' equity, determine interest, depreciation costs, taxes, etc., and thus develop a total dollar figure. This is then divided by total (net of depreciation) investment to arrive at a return on rate base, the figure Ahrens refers to as profit. Fourth, the sinister "two sets of books" referred to is the consequence of the tax laws allowing accelerated depreciation while regulatory commissions require straight line depreciation, not some sinister plot. Fifth, if maximization of investment is so profitable, why are so many utility stocks selling at less than book (historical) costs. This can occur only if stockholders' equity is diluted.

It should also be noted that of the references cited for the article, numbers 1, 2, 3, 4, 8, 9 and 10 are avowed antinuclear sources.

To continue, in 1977 the average cost per kW of nuclear plants brought on line that year was $550/kW. Honest commentators do not cite extreme figures "were *as high as* $645/kilowatt." Also much of the cost is inflation directly attributable to regulatory delays fostered by antinuclear forces such as the Environmental Action Foundation (an Ahrens source). Also, coal fired plants, due to EPA pollution control requirements are close to $1,000/kW for plants started today.

Ahrens' criticism of Pournelle is also faulty. Is he implying that there are no economies of scale in solar technology but rather vast diseconomies. Also, most knowledgeable activists in the solar camp *do not* call conservation, hydro-power, biomass conversion "solar energy" but use their right names.

Finally, Ahrens makes a ludicrous computation of the cost of conservation. If it costs 2.2¢/kWh to save 1.1 billion BTU's of energy, then that's the cost. Subtracting the "energy-value" of the fuel conserved implies that you get the fuel for free by conserving it. You do not! Accepting Ahrens' figures, you would save 3.5¢—2.2¢ = 1.3¢ period. However, Ahrens conveniently ignores the fact that the 3.5¢ includes capital costs, including transmission, distribution, the meter on the house, as well as labor, administration and all other costs. One must be aware of the fact that residential energy *rates* include substantial non-energy costs because it is not economical to meter small (residential) customers for anything other than kWh.

What is clear is that Ahrens is an ignoramus in an area in which he pretends expertise. This is clear from his total lack of knowledge about how electric utility regulation actually works. The recent furor about electricity costs has attracted many similar types to the field, including philosophy professors whose training leaves them totally unqualified in the area. I am appalled that a respected journal of science fiction/science fact would provide a platform for the expression of such errors and lack of knowledge. As for Dr./Mr. Ahrens, I look forward to his appearance in a rate case involving one of my clients. I'd love to rebut his sworn testimony

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and help prepare cross examination. I can also assure him that I will urge that his Analog article be used to impeach his credentials as an expert. It would do nicely.

FREDERICK L. McCOY
Consulting Economist
Suite 700
1225 Connecticut Ave., N.W.
Washington, D.C. 20036

As I've said before but apparently have to repeat from time to time, Guest Editorials and Alternate Views are expressions of the opinions solely of their authors, and the authors are solely responsible for the accuracy of any facts used in support of those opinions. Naturally, anyone appearing in these pages is eligible for dissenting replies from anyone reading them. Controversies tend to be livelier—and sometimes more productive—if more than one side is allowed to speak. And I do hope you don't mean to imply that the mere fact of being an antinuclear source or a philosophy professor renders anyone a priori unable to say anything worth considering.

Dear Analog,

The weakness in Jerry Pournelle's argument in favor of the draft (The Alternate View, June 1980 issue) is the assumption that the US would employ its draft-enhanced military strength with great altruism and wisdom. Given that unspoken assumption, then all the rest follows very logically. Jerry Pournelle points out the many horrible things that are happening, including the extermination of the great cetaceans, the use of nerve gas against Afghan villages, the genocide in Cambodia, and so on. He apparently believes that the US, if it were militarily strong enough, would stop these atrocities. I don't believe it. During the infamous Vietnamese War we *did* have the draft, we did have and employ massive military strength, and we did so in such a way as to bring misery and ruin upon all of southeast Asia; nothing good was accomplished. I see no reason to believe that the US would ever employ military force to protect cetaceans, no matter how much miltary force we have at our disposal. Let's face it: the US has always used military force in the ruthless (and often stupid) pursuit of its real or imagined national self-interest, and it has never used this force for reasons of pure altruism, such as the preservation of the whales. As far as Afghanistan goes, while we might be in a position to send in the troops if we had a larger and better army, the consequences would be more destruction, more nerve gas used against villages, not less.

Do you believe that with a huge conscript army and vast military expenditures the US could be powerful enough to control the whole world, and impose a Pax Americana, in which the rampant atrocities of today would be abolished? A beautiful dream, but I don't think it is possible. And even if it were possible, I don't think that we have or will have a government of sufficient intelligence and vision to successfully implement a program of global domination even if the raw military power existed with which to do so. Maybe if we had Jerry Pournelle as our dictator, things would be different. Then it might be possible. What we really need is a much wiser government before we can reasonably see any value in the draft. As it is we

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would be placing more power in the hands of incompetents who are certain to misuse it.

DAVID PALTER
1811 Tamarind Ave., Apt. 22
Hollywood, CA 90028

Dear Stanley:

Hopefully, Jerry Pournelle's "Alternate View" advocating a return to military conscription in the United States will receive torrential reader response; the issues he raises deserve it. Herewith is my bucket full.

Quarrels can be picked with the practical naysaying in Jerry's piece. As regards the basic feasibility of modern volunteer armed forces, note that we do not draft our other security force, the police, and in those times and places where we make the job, and the screening for it suitable, we end up with a trustworthy, topnotch corps of professionals. Against that, an unlimited manpower pool of impressed troops, although advocated by many people for many reasons, is definitely not a safeguard against adventurism and other abuses. We get what we pay for.

The larger question, that of primary ethics, Jerry addresses by saying that conscription is evil, but less evil than that which it is intended to oppose. This is not supposed, I would think, to say that the end justifies the means, but that we face a "lifeboat" situation where normal ethical prohibitions (e.g., homicide, slavery) are best overridden. Here is where we really part ways.

Grant for a moment that we face an emergency of such peculiar severity that we come to discuss whether to impose millions of man-years of involuntary servitude on our citizenry as a practical solution. A Heinlein thought germane here is that, politically, there are those who believe people should be controlled and those who believe they shouldn't. I have seen this dichotomy dismissed as sterile, puerile, and bad for your health. I haven't seen it refuted. The idea that the collective is in some way metaphysically superior to its component individuals is ancient, has been fundamentally damaged over the ages, but is still quite vigorous in its various forms on the Right and the Left. Government as a mechanism for the free interaction of rational beings is a concept with classic roots, but attempts at implementation are historically recent (and startlingly successful, economically and otherwise). I am not so thoroughly familiar with the Pournelle *opera,* where explication is said to exist, as to be certain, but possibly our difference stems from our philosophies of the efficacy of ethical concepts. I regard inconsistent logic in morality constructs to be fully as catastrophic as bad physics in one's engineering; our present national straits are the result of disjointed bumbling, of the self-imposed blindness of "statesmen" who have said, yes, A implies B, but so what? More of the tonic that made us sick will kill us.

The best thing for the nation to do would be to debate such radical questions, but if it happens, it will be in those pockets of media where ideas are taken as seriously as reality demands they be. Science fiction is one such place.

CHARLES O. FLINK
811 East 11th
Lawrence, KS 66044

Yes!

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RICHARD K. LYON

STANDARDS

Review of Physics
National Institute for Advanced Study
1177 Sixteenth St. N.W.
Washington, D.C. 20036
April 1, 1990

Mr. John Armstrong
Care of the Harvard Club
27 W. 44 St.
New York, N.Y. 10017

Dear Mr. Armstrong,

After careful examination of your manuscript no. 113785, "Corbamite, An Insulator Against Gravity," the editors of *Review of Physics* have concluded that it is not suitable for publication in this journal. This decision is final and further correspondence on this subject will serve no useful purpose.

Since the above may seem somewhat harsh, let me say what I can to mitigate it. The editors do appreciate that you are working under difficult circumstances: when the senior author of a paper is deceased, it is always hard for the junior author to complete the work in an appropriate manner. Also let us assure you that we do believe you. You have told us that with his dying breath Professor Steinhardt handed you his notebook and said, "Have this published in Review of Physics." Such an action would be completely in character for Steinhardt since he was a true scientist.

Our believing the alleged circumstances under which Steinhardt made this final declaration (while he was expiring from disintegrator ray wounds suffered during your escape from the City of Disembodied Brains on Altair IV) is a somewhat different matter, but there is no need to discuss that issue. What is important is that you should recognize that whatever the highly emotional circumstance of Professor Steinhardt's passing may have been, they have no relevance to publication in *Review of Physics*.

The sole criteria for publication in this journal is comments of the referees. In your case these comments were highly negative and I must add that I completely agree. Your paper claims the existence of a substance which insulates against gravity, this being the basis of the "etherflyer" by which you and the late Professor Steinhardt voyaged to Altair IV. Such a substance, however, completely violates elementary potential theory and if it could exist at all would have to be totally different from what you envision.

Since, Mr. Armstrong, you profess yourself to be a "man of action," I am not surprised that you find the above difficult to comprehend. If I may make a suggestion, perhaps you should study any good text in Freshman Physics.

Furthermore while I can readily understand why you wish to visit the referees and personally demonstrate your antigravity apparatus to them, I cannot reveal their identities to you. Referees are anonymous by long standing tradition, one purpose of this tradition being to prevent acrimonious confrontations of the very kind you seek.

Finally I must tell you that your continued visits to the offices of Review of Physics are counter-productive. As you know we are located on the twentieth floor and your floating in and out through our windows is a considerable distraction to the clerical staff.

Sincerely yours,
Oscar C. Toennies
Editor in Chief

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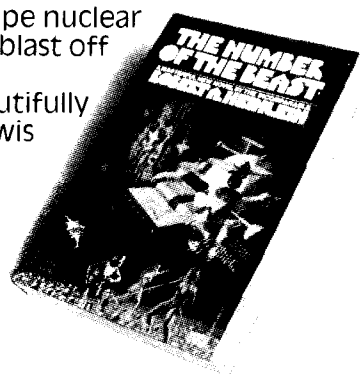

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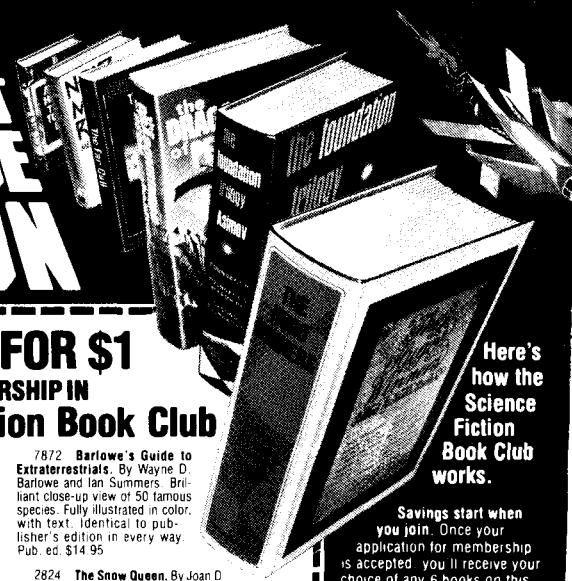

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